Hall & Foreman, Inc.
CIVIL ENGINEERING • LAND PLANNING • LAND SURVEYING

MASTER STORM DRAIN HYDROLOGY CALCS.

FOR
THE CITY OF FONTANA

VOL. III

BY
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JOB #4042
HYDRCALC

MASTER STORM DRAINAGE PLAN
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**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        Copyright 1983,86,87 Advanced Engineering Software (aes)
          Ver. 4.1C  Release Date: 5/11/87  Serial # I00908

                        Especially prepared for:

                            HALL & FOREMAN
 ************************** DESCRIPTION OF STUDY **********************
* N. FONTANA MASTER S.D. PLAN, W. FONTANA CHANNEL LAT. 1, ALONG JUNIPER
* Q 25 YEAR, DESIGN Q, ASSUMES NO OVERFLOW FROM BASELINE S.D.
* JN 3547
 **************************************************************************

  FILE NAME: WFONT1R.025
  TIME/DATE OF STUDY:  0:15   1/ 1/1980
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =   .970
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   25.00   1-HOUR INTENSITY(INCH/HOUR) = 1.1461
  SLOPE OF INTENSITY DURATION CURVE =  .6000



**************************************************************************
  FLOW PROCESS FROM NODE   105.00 TO NODE   105.01 IS CODE =   2
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

  TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
  INITIAL SUBAREA FLOW-LENGTH =   800.00
  UPSTREAM ELEVATION =   1365.00
  DOWNSTREAM ELEVATION =   1355.00
  ELEVATION DIFFERENCE =     10.00
  TC =  .412*[(  800.00** 3.00)/(    10.00)]** .20 =   14.347
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.704
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA RUNOFF(CFS) =     15.28
  TOTAL AREA(ACRES) =      8.00   PEAK FLOW RATE(CFS) =     15.28
```

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****************************************************************************
 FLOW PROCESS FROM NODE   105.01 TO NODE   105.02 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1355.00   DOWNSTREAM ELEVATION =   1340.00
 STREET LENGTH(FEET) =   900.00   CURB HEIGTH(INCHES) = 6.
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  18.50
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   15.28
   STREETFLOW MODEL RESULTS:
      STREET FLOWDEPTH(FEET) =   .42
      HALFSTREET FLOODWIDTH(FEET) =   14.51
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.44
      PRODUCT OF DEPTH&VELOCITY =    1.43
 STREETFLOW TRAVELTIME(MIN) =   4.36   TC(MIN) =  18.71

  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.306
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =    8.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =    8.00   PEAK FLOW RATE(CFS) =     15.28
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .42   HALFSTREET FLOODWIDTH(FEET) = 14.51
 FLOW VELOCITY(FEET/SEC.) =  3.44   DEPTH*VELOCITY =   1.43


****************************************************************************
 FLOW PROCESS FROM NODE   105.10 TO NODE   105.02 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.306
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   19.00   SUBAREA RUNOFF(CFS) =   29.48
 EFFECTIVE AREA(ACRES) =   27.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   27.00
 PEAK FLOW RATE(CFS) =   41.89
 TC(MIN) =  18.71


****************************************************************************
 FLOW PROCESS FROM NODE   105.02 TO NODE   105.03 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
```

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================================================================================
  UPSTREAM ELEVATION =   1340.00   DOWNSTREAM ELEVATION =   1318.50
  STREET LENGTH(FEET) =  1300.00   CURB HEIGTH(INCHES) = 6.
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  18.50
  INTERIOR STREET CROSSFALL(DECIMAL) =   .020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =   .020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

        **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   41.89
  ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS:
        NOTE: STREETFLOW EXCEEDS TOP OF CURB.
        THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .56
        HALFSTREET FLOODWIDTH(FEET) =   20.00
        AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.45
        PRODUCT OF DEPTH&VELOCITY =    2.47
  STREETFLOW TRAVELTIME(MIN) =   4.87   TC(MIN) =  23.58

    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.007
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
  EFFECTIVE AREA(ACRES) =   27.00
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =   27.00   PEAK FLOW RATE(CFS) =     41.89
  END OF SUBAREA STREETFLOW HYDRAULICS:
  DEPTH(FEET) =  .56   HALFSTREET FLOODWIDTH(FEET) = 20.00
  FLOW VELOCITY(FEET/SEC.) =  4.45   DEPTH*VELOCITY =   2.47


****************************************************************************
  FLOW PROCESS FROM NODE   105.20 TO NODE   105.03 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.007
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   26.00   SUBAREA RUNOFF(CFS) =   33.35
  EFFECTIVE AREA(ACRES) =   53.00
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =   53.00
  PEAK FLOW RATE(CFS) =   67.99
  TC(MIN) =  23.58


****************************************************************************
  FLOW PROCESS FROM NODE   105.03 TO NODE   106.10 IS CODE =   4
----------------------------------------------------------------------------
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  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
  PIPEFLOW VELOCITY(FEET/SEC.) =   7.1
  UPSTREAM NODE ELEVATION =  1318.50
  DOWNSTREAM NODE ELEVATION =  1318.00
  FLOWLENGTH(FEET) =   320.00   MANNINGS N =  .013
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =     67.99
  TRAVEL TIME(MIN.) =    .75    TC(MIN.) =  24.33


****************************************************************************
  FLOW PROCESS FROM NODE   106.00 TO NODE   106.10 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.970
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   24.98
  EFFECTIVE AREA(ACRES) =   73.00
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =   73.00
  PEAK FLOW RATE(CFS) =   91.18
  TC(MIN) =  24.33


****************************************************************************
  FLOW PROCESS FROM NODE   106.10 TO NODE   107.10 IS CODE =   4
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
  PIPEFLOW VELOCITY(FEET/SEC.) =   9.5
  UPSTREAM NODE ELEVATION =  1318.00
  DOWNSTREAM NODE ELEVATION =  1317.00
  FLOWLENGTH(FEET) =   320.00   MANNINGS N =  .013
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =     91.18
  TRAVEL TIME(MIN.) =    .56    TC(MIN.) =  24.89


****************************************************************************
  FLOW PROCESS FROM NODE   107.00 TO NODE   107.10 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.943
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   24.50
  EFFECTIVE AREA(ACRES) =   93.00
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =   93.00
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  PEAK FLOW RATE(CFS) =  113.91
  TC(MIN) =  24.89

****************************************************************************
  FLOW PROCESS FROM NODE   107.10 TO NODE   108.10 IS CODE =   4
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
  PIPEFLOW VELOCITY(FEET/SEC.) =   9.1
  UPSTREAM NODE ELEVATION =  1317.00
  DOWNSTREAM NODE ELEVATION =  1315.00
  FLOWLENGTH(FEET) =   640.00   MANNINGS N =  .013
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    113.91
  TRAVEL TIME(MIN.) =   1.18    TC(MIN.) =  26.07

****************************************************************************
  FLOW PROCESS FROM NODE   108.00 TO NODE   108.10 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.890
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   47.08
  EFFECTIVE AREA(ACRES) =  133.00
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =  133.00
  PEAK FLOW RATE(CFS) =  156.55
  TC(MIN) =  26.07

****************************************************************************
  FLOW PROCESS FROM NODE   108.10 TO NODE  108.12 IS CODE =   3
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  35.5 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =  15.7
  UPSTREAM NODE ELEVATION =  1315.00
  DOWNSTREAM NODE ELEVATION =  1294.00
  FLOWLENGTH(FEET) =  1350.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    156.55
  TRAVEL TIME(MIN.) =   1.43    TC(MIN.) =  27.50

****************************************************************************
  FLOW PROCESS FROM NODE   108.11 TO NODE   108.12 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

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==========================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.830
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   44.94
 EFFECTIVE AREA(ACRES) =  173.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  173.00
 PEAK FLOW RATE(CFS) =  194.35
 TC(MIN) =  27.50


**************************************************************************
 FLOW PROCESS FROM NODE   108.12 TO NODE   108.22 IS CODE =   3
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
 DEPTH OF FLOW IN  51.0 INCH PIPE IS  38.7 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  16.8
 UPSTREAM NODE ELEVATION =  1294.00
 DOWNSTREAM NODE ELEVATION =  1272.00
 FLOWLENGTH(FEET) =  1350.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   194.35
 TRAVEL TIME(MIN.) =   1.34    TC(MIN.) =  28.84


**************************************************************************
 FLOW PROCESS FROM NODE   108.20 TO NODE   108.22 IS CODE =   8
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.779
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   43.08
 EFFECTIVE AREA(ACRES) =  213.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  213.00
 PEAK FLOW RATE(CFS) =  229.42
 TC(MIN) =  28.84


**************************************************************************
 FLOW PROCESS FROM NODE   108.22 TO NODE   108.31 IS CODE =   4
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
==========================================================================
 PIPEFLOW VELOCITY(FEET/SEC.) =  16.2
 UPSTREAM NODE ELEVATION =  1272.00
 DOWNSTREAM NODE ELEVATION =  1261.00
 FLOWLENGTH(FEET) =   650.00   MANNINGS N =  .013
 GIVEN PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
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 PIPEFLOW THRU SUBAREA(CFS) =    229.42
 TRAVEL TIME(MIN.) =    .67    TC(MIN.) =  29.51

****************************************************************************
 FLOW PROCESS FROM NODE   108.31 TO NODE   108.31 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  29.51
 RAINFALL INTENSITY (INCH./HOUR) =   1.75
 EFFECTIVE STREAM AREA(ACRES) =  213.00
 TOTAL STREAM AREA(ACRES) =  213.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    229.42

****************************************************************************
 FLOW PROCESS FROM NODE   108.52 TO NODE   108.51 IS CODE =   2
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH =   800.00
 UPSTREAM ELEVATION =   1276.00
 DOWNSTREAM ELEVATION =   1268.00
 ELEVATION DIFFERENCE =      8.00
 TC =  .412*[(  800.00** 3.00)/(     8.00)]** .20 =   15.001
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.633
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA RUNOFF(CFS) =     18.46
 TOTAL AREA(ACRES) =     10.00   PEAK FLOW RATE(CFS) =     18.46

****************************************************************************
 FLOW PROCESS FROM NODE   108.51 TO NODE   108.41 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1268.00   DOWNSTREAM ELEVATION =   1263.00
 STREET LENGTH(FEET) =   600.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   18.46
   STREETFLOW MODEL RESULTS:
      STREET FLOWDEPTH(FEET) =   .58
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        HALFSTREET FLOODWIDTH(FEET) =   15.13
        AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.00
        PRODUCT OF DEPTH&VELOCITY =    1.74
 STREETFLOW TRAVELTIME(MIN) =   3.33   TC(MIN) =  18.34

  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.334
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   10.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =   10.00   PEAK FLOW RATE(CFS) =     18.46
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .58   HALFSTREET FLOODWIDTH(FEET) = 15.13
 FLOW VELOCITY(FEET/SEC.) =  3.00   DEPTH*VELOCITY =   1.74


****************************************************************************
 FLOW PROCESS FROM NODE   108.42 TO NODE   108.41 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.334
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   10.00   SUBAREA RUNOFF(CFS) =   15.77
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   20.00
 PEAK FLOW RATE(CFS) =   31.54
 TC(MIN) =  18.34


****************************************************************************
 FLOW PROCESS FROM NODE   108.43 TO NODE   108.41 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.334
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   15.00   SUBAREA RUNOFF(CFS) =   23.66
 EFFECTIVE AREA(ACRES) =   35.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   35.00
 PEAK FLOW RATE(CFS) =   55.20
 TC(MIN) =  18.34


****************************************************************************
 FLOW PROCESS FROM NODE   108.41 TO NODE   108.31 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
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```
 DEPTH OF FLOW IN  51.0 INCH PIPE IS  36.3 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   5.1
 UPSTREAM NODE ELEVATION =  1263.00
 DOWNSTREAM NODE ELEVATION =  1261.00
 FLOWLENGTH(FEET) =  1300.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =     55.20
 TRAVEL TIME(MIN.) =   4.24    TC(MIN.) =  22.57


****************************************************************************
 FLOW PROCESS FROM NODE   108.30 TO NODE   108.31 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.060
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   26.61
 EFFECTIVE AREA(ACRES) =   55.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   55.00
 PEAK FLOW RATE(CFS) =   73.18
 TC(MIN) =  22.57


****************************************************************************
 FLOW PROCESS FROM NODE   108.35 TO NODE   108.31 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.060
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   26.61
 EFFECTIVE AREA(ACRES) =   75.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   75.00
 PEAK FLOW RATE(CFS) =   99.79
 TC(MIN) =  22.57


****************************************************************************
 FLOW PROCESS FROM NODE   108.31 TO NODE   108.31 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MINUTES) =  22.57
 RAINFALL INTENSITY (INCH./HOUR) =   2.06
 EFFECTIVE STREAM AREA(ACRES) =   75.00
 TOTAL STREAM AREA(ACRES) =   75.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     99.79
```

```
 CONFLUENCE INFORMATION:
 STREAM    PEAK FLOW    TIME    INTENSITY     FM     EFFECTIVE
 NUMBER    RATE(CFS)   (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
-------------------------------------------------------------------
    1       229.42      29.51       1.754      .58       213.00
    2        99.79      22.57       2.060      .58        75.00

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.
 SUMMARY RESULTS:
 STREAM    CONFLUENCE    EFFECTIVE
 NUMBER      Q(CFS)     AREA(ACRES)
-----------------------------------------------
    1       308.56        288.00
    2       321.09        237.93
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    321.09   TIME(MINUTES) =   22.574
 EFFECTIVE AREA(ACRES) =    237.93
 TOTAL AREA(ACRES) =    288.00


****************************************************************************
 FLOW PROCESS FROM NODE   108.31 TO NODE   108.32 IS CODE =   4
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
 PIPEFLOW VELOCITY(FEET/SEC.) =  22.6
 UPSTREAM NODE ELEVATION =  1261.00
 DOWNSTREAM NODE ELEVATION =  1249.00
 FLOWLENGTH(FEET) =   650.00   MANNINGS N =  .013
 GIVEN PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    321.09
 TRAVEL TIME(MIN.) =    .48    TC(MIN.) =  23.05


****************************************************************************
 FLOW PROCESS FROM NODE   108.32 TO NODE   108.33 IS CODE =   4
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
 PIPEFLOW VELOCITY(FEET/SEC.) =  20.2
 UPSTREAM NODE ELEVATION =  1249.00
 DOWNSTREAM NODE ELEVATION =  1243.00
 FLOWLENGTH(FEET) =   300.00   MANNINGS N =  .013
 GIVEN PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    321.09
 TRAVEL TIME(MIN.) =    .25    TC(MIN.) =  23.30
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =    288.00
 EFFECTIVE AREA(ACRES) =    237.93
 PEAK FLOW RATE(CFS)    =    321.09
============================================================================
```

END OF RATIONAL METHOD ANALYSIS

```
**********************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        Copyright 1983,86,87 Advanced Engineering Software (aes)
           Ver. 4.1C  Release Date: 5/11/87  Serial # I00908

                        Especially prepared for:

                             HALL & FOREMAN
 ************************** DESCRIPTION OF STUDY ***********************
* N. FONTANA MASTER S.D. PLAN, W. FONTANA LAT. 1, ALONG JUNIPER
* Q 100 YEAR, NOT DESIGN Q
* JN 3547
 **********************************************************************

  FILE NAME: WFONT1R.100
  TIME/DATE OF STUDY:  0:31   1/ 1/1980
======================================================================
  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 =
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =   .970
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) = 1.4700
  SLOPE OF INTENSITY DURATION CURVE =  .6000



**********************************************************************
  FLOW PROCESS FROM NODE   105.00 TO NODE  105.01 IS CODE =   2
----------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
======================================================================
  DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

  TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
  INITIAL SUBAREA FLOW-LENGTH =   800.00
  UPSTREAM ELEVATION =   1365.00
  DOWNSTREAM ELEVATION =   1355.00
  ELEVATION DIFFERENCE =     10.00
  TC =  .412*[(  800.00** 3.00)/(    10.00)]** .20 =   14.347
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.469
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA RUNOFF(CFS) =     20.78
  TOTAL AREA(ACRES) =      8.00   PEAK FLOW RATE(CFS) =     20.78
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   105.01 TO NODE   105.02 IS CODE =   6
----------------------------------------------------------------------------
  >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM ELEVATION =   1355.00   DOWNSTREAM ELEVATION =   1340.00
  STREET LENGTH(FEET) =   900.00   CURB HEIGTH(INCHES) = 6.
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  18.50
  INTERIOR STREET CROSSFALL(DECIMAL) =   .020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =   .020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

        **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   20.78
    STREETFLOW MODEL RESULTS:
        STREET FLOWDEPTH(FEET) =   .45
        HALFSTREET FLOODWIDTH(FEET) =   16.24
        AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.77
        PRODUCT OF DEPTH&VELOCITY =    1.70
  STREETFLOW TRAVELTIME(MIN) =   3.98   TC(MIN) =  18.33

   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.995
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
  EFFECTIVE AREA(ACRES) =    8.00
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =    8.00   PEAK FLOW RATE(CFS) =     20.78
  END OF SUBAREA STREETFLOW HYDRAULICS:
  DEPTH(FEET) =  .45   HALFSTREET FLOODWIDTH(FEET) = 16.24
  FLOW VELOCITY(FEET/SEC.) =  3.77   DEPTH*VELOCITY =   1.70


****************************************************************************
  FLOW PROCESS FROM NODE   105.10 TO NODE   105.02 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.995
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   19.00   SUBAREA RUNOFF(CFS) =   41.26
  EFFECTIVE AREA(ACRES) =   27.00
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =   27.00
  PEAK FLOW RATE(CFS) =   58.63
  TC(MIN) =  18.33


****************************************************************************
  FLOW PROCESS FROM NODE   105.02 TO NODE   105.03 IS CODE =   6
----------------------------------------------------------------------------
  >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
```

```
==========================================================================
  UPSTREAM ELEVATION =   1340.00   DOWNSTREAM ELEVATION =   1318.50
  STREET LENGTH(FEET) =  1300.00   CURB HEIGTH(INCHES) = 6.
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  18.50
  INTERIOR STREET CROSSFALL(DECIMAL) =   .020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =   .020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

       **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   58.63
  ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS:
       NOTE: STREETFLOW EXCEEDS TOP OF CURB.
       THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .59
       HALFSTREET FLOODWIDTH(FEET) =   20.00
       AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.34
       PRODUCT OF DEPTH&VELOCITY =    3.18
  STREETFLOW TRAVELTIME(MIN) =   4.05   TC(MIN) =  22.38

   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.656
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
  EFFECTIVE AREA(ACRES) =   27.00
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =   27.00   PEAK FLOW RATE(CFS) =     58.63
  END OF SUBAREA STREETFLOW HYDRAULICS:
  DEPTH(FEET) =  .59   HALFSTREET FLOODWIDTH(FEET) = 20.00
  FLOW VELOCITY(FEET/SEC.) =  5.34   DEPTH*VELOCITY =   3.18


****************************************************************************
  FLOW PROCESS FROM NODE   105.20 TO NODE   105.03 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.656
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   26.00   SUBAREA RUNOFF(CFS) =   48.54
  EFFECTIVE AREA(ACRES) =   53.00
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =   53.00
  PEAK FLOW RATE(CFS) =   98.95
  TC(MIN) =  22.38


****************************************************************************
  FLOW PROCESS FROM NODE   105.03 TO NODE   106.10 IS CODE =   4
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
  PIPEFLOW VELOCITY(FEET/SEC.) =  10.3
  UPSTREAM NODE ELEVATION =  1318.50
  DOWNSTREAM NODE ELEVATION =  1318.00
  FLOWLENGTH(FEET) =   320.00   MANNINGS N =  .013
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =     98.95
  TRAVEL TIME(MIN.) =    .52    TC(MIN.) =  22.90


****************************************************************************
  FLOW PROCESS FROM NODE   106.00 TO NODE   106.10 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.620
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   36.69
  EFFECTIVE AREA(ACRES) =   73.00
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =   73.00
  PEAK FLOW RATE(CFS) =  133.91
  TC(MIN) =  22.90


****************************************************************************
  FLOW PROCESS FROM NODE   106.10 TO NODE   107.10 IS CODE =   4
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
  PIPEFLOW VELOCITY(FEET/SEC.) =  13.9
  UPSTREAM NODE ELEVATION =  1318.00
  DOWNSTREAM NODE ELEVATION =  1317.00
  FLOWLENGTH(FEET) =   320.00   MANNINGS N =  .013
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    133.91
  TRAVEL TIME(MIN.) =    .38    TC(MIN.) =  23.28


****************************************************************************
  FLOW PROCESS FROM NODE   107.00 TO NODE   107.10 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.594
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   36.22
  EFFECTIVE AREA(ACRES) =   93.00
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =   93.00
```

```
  PEAK FLOW RATE(CFS) =  168.42
  TC(MIN) =  23.28

****************************************************************************
  FLOW PROCESS FROM NODE   107.10 TO NODE   108.10 IS CODE =   4
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
  PIPEFLOW VELOCITY(FEET/SEC.) =  13.4
  UPSTREAM NODE ELEVATION =  1317.00
  DOWNSTREAM NODE ELEVATION =  1315.00
  FLOWLENGTH(FEET) =   640.00   MANNINGS N =  .013
  GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    168.42
  TRAVEL TIME(MIN.) =    .80    TC(MIN.) =  24.08

****************************************************************************
  FLOW PROCESS FROM NODE   108.00 TO NODE   108.10 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.542
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   70.58
  EFFECTIVE AREA(ACRES) =  133.00
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =  133.00
  PEAK FLOW RATE(CFS) =  234.66
  TC(MIN) =  24.08

****************************************************************************
  FLOW PROCESS FROM NODE   108.10 TO NODE   108.12 IS CODE =   3
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  43.4 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =  17.1
  UPSTREAM NODE ELEVATION =  1315.00
  DOWNSTREAM NODE ELEVATION =  1294.00
  FLOWLENGTH(FEET) =  1350.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    234.66
  TRAVEL TIME(MIN.) =   1.31    TC(MIN.) =  25.39

****************************************************************************
  FLOW PROCESS FROM NODE   108.11 TO NODE   108.12 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
================================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.463
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   67.71
EFFECTIVE AREA(ACRES) =  173.00
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =  173.00
PEAK FLOW RATE(CFS) =  292.83
TC(MIN) =  25.39


****************************************************************************
FLOW PROCESS FROM NODE   108.12 TO NODE   108.22 IS CODE =   3
----------------------------------------------------------------------------
>>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
DEPTH OF FLOW IN  60.0 INCH PIPE IS  44.7 INCHES
PIPEFLOW VELOCITY(FEET/SEC.) =  18.7
UPSTREAM NODE ELEVATION =  1294.00
DOWNSTREAM NODE ELEVATION =  1272.00
FLOWLENGTH(FEET) =  1350.00   MANNINGS N =  .013
ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
PIPEFLOW THRU SUBAREA(CFS) =   292.83
TRAVEL TIME(MIN.) =   1.20    TC(MIN.) =  26.59


****************************************************************************
FLOW PROCESS FROM NODE   108.20 TO NODE   108.22 IS CODE =   8
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.395
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   65.27
EFFECTIVE AREA(ACRES) =  213.00
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =  213.00
PEAK FLOW RATE(CFS) =  347.59
TC(MIN) =  26.59


****************************************************************************
FLOW PROCESS FROM NODE   108.22 TO NODE   108.31 IS CODE =   4
----------------------------------------------------------------------------
>>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
PIPEFLOW VELOCITY(FEET/SEC.) =  24.5
UPSTREAM NODE ELEVATION =  1272.00
DOWNSTREAM NODE ELEVATION =  1261.00
FLOWLENGTH(FEET) =   650.00   MANNINGS N =  .013
GIVEN PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
```

```
 PIPEFLOW THRU SUBAREA(CFS) =    347.59
 TRAVEL TIME(MIN.) =     .44    TC(MIN.) =  27.04

****************************************************************************
 FLOW PROCESS FROM NODE   108.31 TO NODE   108.31 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  27.04
 RAINFALL INTENSITY (INCH./HOUR) =   2.37
 EFFECTIVE STREAM AREA(ACRES) =  213.00
 TOTAL STREAM AREA(ACRES) =  213.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    347.59

****************************************************************************
 FLOW PROCESS FROM NODE   108.52 TO NODE   108.51 IS CODE =   2
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH =   800.00
 UPSTREAM ELEVATION =   1276.00
 DOWNSTREAM ELEVATION =   1268.00
 ELEVATION DIFFERENCE =      8.00
 TC =  .412*[(  800.00** 3.00)/(     8.00)]** .20 =   15.001
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.377
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA RUNOFF(CFS) =     25.15
 TOTAL AREA(ACRES) =     10.00   PEAK FLOW RATE(CFS) =     25.15

****************************************************************************
 FLOW PROCESS FROM NODE   108.51 TO NODE   108.41 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1268.00   DOWNSTREAM ELEVATION =   1263.00
 STREET LENGTH(FEET) =   600.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   25.15
   STREETFLOW MODEL RESULTS:
      STREET FLOWDEPTH(FEET) =   .63
```

```
        HALFSTREET FLOODWIDTH(FEET) =   17.38
        AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.30
        PRODUCT OF DEPTH&VELOCITY =    2.07
 STREETFLOW TRAVELTIME(MIN) =   3.03   TC(MIN) =  18.03

 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.024
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   10.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   10.00   PEAK FLOW RATE(CFS) =     25.15
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .63   HALFSTREET FLOODWIDTH(FEET) = 17.38
 FLOW VELOCITY(FEET/SEC.) =  3.30   DEPTH*VELOCITY =   2.07


****************************************************************************
 FLOW PROCESS FROM NODE   108.42 TO NODE   108.41 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.024
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   10.00   SUBAREA RUNOFF(CFS) =   21.98
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   20.00
 PEAK FLOW RATE(CFS) =   43.96
 TC(MIN) =  18.03


****************************************************************************
 FLOW PROCESS FROM NODE   108.43 TO NODE   108.41 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.024
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   15.00   SUBAREA RUNOFF(CFS) =   32.97
 EFFECTIVE AREA(ACRES) =   35.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   35.00
 PEAK FLOW RATE(CFS) =   76.93
 TC(MIN) =  18.03


****************************************************************************
 FLOW PROCESS FROM NODE   108.41 TO NODE   108.31 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  41.7 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   5.5
 UPSTREAM NODE ELEVATION =  1263.00
 DOWNSTREAM NODE ELEVATION =  1261.00
 FLOWLENGTH(FEET) =  1300.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =     76.93
 TRAVEL TIME(MIN.) =   3.91    TC(MIN.) =  21.94

****************************************************************************
 FLOW PROCESS FROM NODE   108.30 TO NODE   108.31 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.688
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   37.91
 EFFECTIVE AREA(ACRES) =   55.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   55.00
 PEAK FLOW RATE(CFS) =  104.24
 TC(MIN) =  21.94

****************************************************************************
 FLOW PROCESS FROM NODE   108.35 TO NODE   108.31 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.688
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   37.91
 EFFECTIVE AREA(ACRES) =   75.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   75.00
 PEAK FLOW RATE(CFS) =  142.15
 TC(MIN) =  21.94

****************************************************************************
 FLOW PROCESS FROM NODE   108.31 TO NODE   108.31 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MINUTES) =  21.94
 RAINFALL INTENSITY (INCH./HOUR) =   2.69
 EFFECTIVE STREAM AREA(ACRES) =   75.00
 TOTAL STREAM AREA(ACRES) =   75.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    142.15
```

```
  CONFLUENCE INFORMATION:
  STREAM    PEAK FLOW    TIME    INTENSITY     FM     EFFECTIVE
  NUMBER    RATE(CFS)   (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
-------------------------------------------------------------------
    1       347.59      27.04       2.372      .58       213.00
    2       142.15      21.94       2.688      .58        75.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.
  SUMMARY RESULTS:
  STREAM    CONFLUENCE    EFFECTIVE
  NUMBER      Q(CFS)     AREA(ACRES)
-----------------------------------------
    1       468.39        288.00
    2       474.14        247.89
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    474.14   TIME(MINUTES) =   21.944
  EFFECTIVE AREA(ACRES) =    247.89
  TOTAL AREA(ACRES) =    288.00


****************************************************************************
  FLOW PROCESS FROM NODE   108.31 TO NODE   108.32 IS CODE =   4
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
  PIPEFLOW VELOCITY(FEET/SEC.) =  33.4
  UPSTREAM NODE ELEVATION =  1261.00
  DOWNSTREAM NODE ELEVATION =  1249.00
  FLOWLENGTH(FEET) =   650.00   MANNINGS N =  .013
  GIVEN PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    474.14
  TRAVEL TIME(MIN.) =    .32    TC(MIN.) =  22.27


****************************************************************************
  FLOW PROCESS FROM NODE   108.32 TO NODE   108.33 IS CODE =   4
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
  PIPEFLOW VELOCITY(FEET/SEC.) =  29.8
  UPSTREAM NODE ELEVATION =  1249.00
  DOWNSTREAM NODE ELEVATION =  1243.00
  FLOWLENGTH(FEET) =   300.00   MANNINGS N =  .013
  GIVEN PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    474.14
  TRAVEL TIME(MIN.) =    .17    TC(MIN.) =  22.44
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =    288.00
  EFFECTIVE AREA(ACRES) =    247.89
  PEAK FLOW RATE(CFS)    =    474.14
============================================================================
```

END OF RATIONAL METHOD ANALYSIS

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        Copyright 1983,86,87 Advanced Engineering Software (aes)
          Ver. 4.1C  Release Date: 5/11/87  Serial # I00908

                        Especially prepared for:

                            HALL & FOREMAN
 ************************* DESCRIPTION OF STUDY **********************
* N. FONTANA MASTER S.D. PLAN, W. FONTANA CHANNEL LAT. 2, ALONG CYPRESS
* Q 100-25, DESIGN Q, INCLUDES OVERFLOW FROM BASELINE S.D. SYSTEM
* JN 3547
 **************************************************************************

  FILE NAME: WFONLAT2.DAT
  TIME/DATE OF STUDY:  7:37   1/ 1/1980
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =   .970
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   25.00   1-HOUR INTENSITY(INCH/HOUR) = 1.1461
  SLOPE OF INTENSITY DURATION CURVE =  .6000



**************************************************************************
  FLOW PROCESS FROM NODE   100.00 TO NODE  100.01 IS CODE =   2
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

  TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
  INITIAL SUBAREA FLOW-LENGTH =   900.00
  UPSTREAM ELEVATION =   1417.00
  DOWNSTREAM ELEVATION =   1408.00
  ELEVATION DIFFERENCE =      9.00
  TC =  .412*[(  900.00** 3.00)/(     9.00)]** .20 =   15.725
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.560
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA RUNOFF(CFS) =     17.80
  TOTAL AREA(ACRES) =     10.00   PEAK FLOW RATE(CFS) =     17.80
```

```
****************************************************************************
 FLOW PROCESS FROM NODE   100.01 TO NODE   100.02 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1408.00   DOWNSTREAM ELEVATION =   1364.00
 STREET LENGTH(FEET) =  2200.00   CURB HEIGTH(INCHES) = 6.
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  18.50
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   17.80
   STREETFLOW MODEL RESULTS:
      STREET FLOWDEPTH(FEET) =   .42
      HALFSTREET FLOODWIDTH(FEET) =   14.51
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.00
      PRODUCT OF DEPTH&VELOCITY =    1.67
 STREETFLOW TRAVELTIME(MIN) =   9.16   TC(MIN) =  24.88

  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.943
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   10.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   10.00   PEAK FLOW RATE(CFS) =     17.80
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .42   HALFSTREET FLOODWIDTH(FEET) = 14.51
 FLOW VELOCITY(FEET/SEC.) =  4.00   DEPTH*VELOCITY =   1.67


****************************************************************************
 FLOW PROCESS FROM NODE   100.10 TO NODE   100.02 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.943
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   41.00   SUBAREA RUNOFF(CFS) =   50.24
 EFFECTIVE AREA(ACRES) =   51.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   51.00
 PEAK FLOW RATE(CFS) =   62.49
 TC(MIN) =  24.88


****************************************************************************
 FLOW PROCESS FROM NODE   100.02 TO NODE   101.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  39.8 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =   5.0
  UPSTREAM NODE ELEVATION =  1364.00
  DOWNSTREAM NODE ELEVATION =  1363.60
  FLOWLENGTH(FEET) =   300.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =     62.49
  TRAVEL TIME(MIN.) =   1.00    TC(MIN.) =  25.89


****************************************************************************
  FLOW PROCESS FROM NODE   101.00 TO NODE   101.10 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.898
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   23.68
  EFFECTIVE AREA(ACRES) =   71.00
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =   71.00
  PEAK FLOW RATE(CFS) =   84.08
  TC(MIN) =  25.89


****************************************************************************
  FLOW PROCESS FROM NODE   101.10 TO NODE   102.10 IS CODE =   3
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  44.8 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =   5.3
  UPSTREAM NODE ELEVATION =  1363.60
  DOWNSTREAM NODE ELEVATION =  1363.20
  FLOWLENGTH(FEET) =   300.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =     84.08
  TRAVEL TIME(MIN.) =    .94    TC(MIN.) =  26.82


****************************************************************************
  FLOW PROCESS FROM NODE   102.00 TO NODE   102.10 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.858
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   22.96
  EFFECTIVE AREA(ACRES) =   91.00
  AVERAGED Fm(INCH/HR) =   .582
```

```
 TOTAL AREA(ACRES) =   91.00
 PEAK FLOW RATE(CFS) =  104.49
 TC(MIN) =  26.82

****************************************************************************
 FLOW PROCESS FROM NODE   102.10 TO NODE   103.10 IS CODE =   4
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
 DEPTH OF FLOW IN  63.0 INCH PIPE IS  42.9 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   6.6
 UPSTREAM NODE ELEVATION =  1363.20
 DOWNSTREAM NODE ELEVATION =  1362.00
 FLOWLENGTH(FEET) =   600.00   MANNINGS N =  .013
 GIVEN PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    104.49
 TRAVEL TIME(MIN.) =   1.50    TC(MIN.) =  28.33

****************************************************************************
 FLOW PROCESS FROM NODE   103.00 TO NODE   103.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.798
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   43.78
 EFFECTIVE AREA(ACRES) =  131.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  131.00
 PEAK FLOW RATE(CFS) =  143.36
 TC(MIN) =  28.33

****************************************************************************
 FLOW PROCESS FROM NODE   103.10 TO NODE   103.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  28.33
 RAINFALL INTENSITY (INCH./HOUR) =   1.80
 EFFECTIVE STREAM AREA(ACRES) =  131.00
 TOTAL STREAM AREA(ACRES) =  131.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    143.36

****************************************************************************
 FLOW.PROCESS FROM NODE   211.10 TO NODE   211.10 IS CODE =   7
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
```

```
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  19.10   RAIN INTENSITY(INCH/HOUR) =  2.28
 EFFECTIVE AREA(ACRES) =    41.00
 TOTAL AREA(ACRES) =    41.00   PEAK FLOW RATE(CFS) =     92.00
 AVERAGED LOSS RATE, Fm(IN/HR) =   .582


****************************************************************************
 FLOW PROCESS FROM NODE   211.10 TO NODE   103.10 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1412.00   DOWNSTREAM ELEVATION =   1362.00
 STREET LENGTH(FEET) =  2750.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

       **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   92.00
 ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS:
       NOTE: STREETFLOW EXCEEDS TOP OF CURB.
       THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .79
       HALFSTREET FLOODWIDTH(FEET) =   20.00
       AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.63
       PRODUCT OF DEPTH&VELOCITY =    5.21
 STREETFLOW TRAVELTIME(MIN) =   6.91   TC(MIN) =  26.01

   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.892
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   41.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   41.00   PEAK FLOW RATE(CFS) =     92.00
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .79   HALFSTREET FLOODWIDTH(FEET) = 20.00
 FLOW VELOCITY(FEET/SEC.) =  6.63   DEPTH*VELOCITY =   5.21


****************************************************************************
 FLOW PROCESS FROM NODE   103.10 TO NODE   103.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MINUTES) =  26.01
```

```
 RAINFALL INTENSITY (INCH./HOUR) =   1.89
 EFFECTIVE STREAM AREA(ACRES) =   41.00
 TOTAL STREAM AREA(ACRES) =   41.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     92.00

 CONFLUENCE INFORMATION:
 STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
 NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
-------------------------------------------------------------
   1      143.36     28.33       1.798     .58      131.00
   2       92.00     26.01       1.892     .58       41.00

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.
 SUMMARY RESULTS:
 STREAM   CONFLUENCE   EFFECTIVE
 NUMBER     Q(CFS)    AREA(ACRES)
---------------------------------------------
   1      228.74       172.00
   2      233.86       161.29
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    233.86   TIME(MINUTES) =   26.013
 EFFECTIVE AREA(ACRES) =    161.29
 TOTAL AREA(ACRES) =    172.00


**************************************************************************
 FLOW PROCESS FROM NODE   103.10 TO NODE   104.22 IS CODE =   4
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
==========================================================================
 PIPEFLOW VELOCITY(FEET/SEC.) =  10.8
 UPSTREAM NODE ELEVATION =  1362.00
 DOWNSTREAM NODE ELEVATION =  1359.00
 FLOWLENGTH(FEET) =   600.00   MANNINGS N =  .013
 GIVEN PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    233.86
 TRAVEL TIME(MIN.) =    .93    TC(MIN.) =  26.94


**************************************************************************
 FLOW PROCESS FROM NODE   104.21 TO NODE   104.22 IS CODE =   8
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.853
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   45.76
 EFFECTIVE AREA(ACRES) =  201.29
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  212.00
 PEAK FLOW RATE(CFS) =  233.86
 TC(MIN) =  26.94
```

```
**************************************************************************
 FLOW PROCESS FROM NODE   104.22 TO NODE   104.10 IS CODE =   4
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
==========================================================================
 PIPEFLOW VELOCITY(FEET/SEC.) =  10.8
 UPSTREAM NODE ELEVATION =  1359.00
 DOWNSTREAM NODE ELEVATION =  1356.00
 FLOWLENGTH(FEET) =   600.00   MANNINGS N =  .013
 GIVEN PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    233.86
 TRAVEL TIME(MIN.) =    .93    TC(MIN.) =  27.86


**************************************************************************
 FLOW PROCESS FROM NODE   104.31 TO NODE   104.10 IS CODE =   8
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.816
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   44.42
 EFFECTIVE AREA(ACRES) =  241.29
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  252.00
 PEAK FLOW RATE(CFS) =  267.96
 TC(MIN) =  27.86


**************************************************************************
 FLOW PROCESS FROM NODE   104.10 TO NODE   104.10 IS CODE =   1
--------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  27.86
 RAINFALL INTENSITY (INCH./HOUR) =   1.82
 EFFECTIVE STREAM AREA(ACRES) =  241.29
 TOTAL STREAM AREA(ACRES) =  252.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    267.96


**************************************************************************
 FLOW PROCESS FROM NODE   212.10 TO NODE   212.10 IS CODE =   7
--------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
==========================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  18.60   RAIN INTENSITY(INCH/HOUR) =  2.31
 EFFECTIVE AREA(ACRES) =    45.10
 TOTAL AREA(ACRES) =    45.10   PEAK FLOW RATE(CFS) =     96.40
```

```
 AVERAGED LOSS RATE, Fm(IN/HR) =   .582

****************************************************************************
 FLOW PROCESS FROM NODE   212.10 TO NODE   104.10 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1408.00   DOWNSTREAM ELEVATION =   1356.00
 STREET LENGTH(FEET) =  2750.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

       **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   96.40
 ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS:
       NOTE: STREETFLOW EXCEEDS TOP OF CURB.
       THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .81
       HALFSTREET FLOODWIDTH(FEET) =   20.00
       AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.58
       PRODUCT OF DEPTH&VELOCITY =    5.30
 STREETFLOW TRAVELTIME(MIN) =   6.97   TC(MIN) =  25.57

   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.912
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   45.10
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   45.10   PEAK FLOW RATE(CFS) =    96.40
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .81   HALFSTREET FLOODWIDTH(FEET) = 20.00
 FLOW VELOCITY(FEET/SEC.) =  6.58   DEPTH*VELOCITY =   5.30


****************************************************************************
 FLOW PROCESS FROM NODE   104.10 TO NODE   104.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MINUTES) =  25.57
 RAINFALL INTENSITY (INCH./HOUR) =   1.91
 EFFECTIVE STREAM AREA(ACRES) =   45.10
 TOTAL STREAM AREA(ACRES) =   45.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    96.40
```

```
 CONFLUENCE INFORMATION:
 STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
 NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
-------------------------------------------------------------
   1      267.96     27.86      1.816     .58      241.29
   2       96.40     25.57      1.912     .58       45.10

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.
 SUMMARY RESULTS:
 STREAM   CONFLUENCE   EFFECTIVE
 NUMBER     Q(CFS)    AREA(ACRES)
-------------------------------------------
   1      357.39        286.39
   2      361.44        266.51
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    361.44   TIME(MINUTES) =   25.569
 EFFECTIVE AREA(ACRES) =    266.51
 TOTAL AREA(ACRES) =    297.10


****************************************************************************
 FLOW PROCESS FROM NODE   104.10 TO NODE   109.23 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  63.0 INCH PIPE IS  49.9 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  19.6
 UPSTREAM NODE ELEVATION =  1356.00
 DOWNSTREAM NODE ELEVATION =  1311.00
 FLOWLENGTH(FEET) =  2700.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    361.44
 TRAVEL TIME(MIN.) =   2.29    TC(MIN.) =  27.86


****************************************************************************
 FLOW PROCESS FROM NODE   109.23 TO NODE   109.23 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  27.86
 RAINFALL INTENSITY (INCH./HOUR) =   1.82
 EFFECTIVE STREAM AREA(ACRES) =  266.51
 TOTAL STREAM AREA(ACRES) =  297.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    361.44


****************************************************************************
 FLOW PROCESS FROM NODE   109.00 TO NODE   109.01 IS CODE =   2
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
==========================================================================
 DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH =  1000.00
 UPSTREAM ELEVATION =   1362.00
 DOWNSTREAM ELEVATION =   1345.00
 ELEVATION DIFFERENCE =     17.00
 TC =  .412*[( 1000.00** 3.00)/(    17.00)]** .20 =   14.751
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.660
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA RUNOFF(CFS) =      8.60
 TOTAL AREA(ACRES) =      4.60   PEAK FLOW RATE(CFS) =      8.60


**************************************************************************
 FLOW PROCESS FROM NODE   109.01 TO NODE   109.11 IS CODE =   5
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
 UPSTREAM NODE ELEVATION =   1345.00
 DOWNSTREAM NODE ELEVATION =   1326.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =      8.60
 FLOW VELOCITY(FEET/SEC) =   3.84   FLOW DEPTH(FEET) =    .55
 TRAVEL TIME(MIN.) =   4.34   TC(MIN.) =  19.09


**************************************************************************
 FLOW PROCESS FROM NODE   109.10 TO NODE   109.11 IS CODE =   8
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.279
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =    4.60   SUBAREA RUNOFF(CFS) =    7.02
 EFFECTIVE AREA(ACRES) =    9.20
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =    9.20
 PEAK FLOW RATE(CFS) =   14.05
 TC(MIN) =  19.09


**************************************************************************
 FLOW PROCESS FROM NODE   109.11 TO NODE   109.02 IS CODE =   5
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
 UPSTREAM NODE ELEVATION =   1326.00
```

```
 DOWNSTREAM NODE ELEVATION =   1314.30
 CHANNEL LENGTH THRU SUBAREA(FEET) =   650.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     14.05
 FLOW VELOCITY(FEET/SEC) =   4.28   FLOW DEPTH(FEET) =    .73
 TRAVEL TIME(MIN.) =   2.53   TC(MIN.) =  21.62


****************************************************************************
 FLOW PROCESS FROM NODE   109.20 TO NODE   109.02 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.115
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =    3.00   SUBAREA RUNOFF(CFS) =    4.14
 EFFECTIVE AREA(ACRES) =   12.20
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   12.20
 PEAK FLOW RATE(CFS) =   16.83
 TC(MIN) =  21.62


****************************************************************************
 FLOW PROCESS FROM NODE   109.02 TO NODE   109.12 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1314.30   DOWNSTREAM ELEVATION =   1313.50
 STREET LENGTH(FEET) =   200.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 32.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  24.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   16.83
   STREETFLOW MODEL RESULTS:
      STREET FLOWDEPTH(FEET) =   .63
      HALFSTREET FLOODWIDTH(FEET) =   17.37
      AVERAGE FLOW VELOCITY(FEET/SEC.) =   2.21
      PRODUCT OF DEPTH&VELOCITY =   1.38
 STREETFLOW TRAVELTIME(MIN) =   1.51   TC(MIN) =  23.13

   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.031
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   12.20
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   12.20   PEAK FLOW RATE(CFS) =     16.83
```

```
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .63   HALFSTREET FLOODWIDTH(FEET) = 17.37
 FLOW VELOCITY(FEET/SEC.) =  2.21   DEPTH*VELOCITY =   1.38


****************************************************************************
 FLOW PROCESS FROM NODE   109.30 TO NODE   109.12 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.031
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   10.00   SUBAREA RUNOFF(CFS) =   13.04
 EFFECTIVE AREA(ACRES) =   22.20
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   22.20
 PEAK FLOW RATE(CFS) =   28.94
 TC(MIN) =  23.13


****************************************************************************
 FLOW PROCESS FROM NODE   109.12 TO NODE   109.22 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1313.50   DOWNSTREAM ELEVATION =   1311.00
 STREET LENGTH(FEET) =   350.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 32.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  24.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   28.94
   STREETFLOW MODEL RESULTS:
      NOTE: STREETFLOW EXCEEDS TOP OF CURB.
      THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .67
      HALFSTREET FLOODWIDTH(FEET) =   19.62
      AVERAGE FLOW VELOCITY(FEET/SEC.) =   3.12
      PRODUCT OF DEPTH&VELOCITY =   2.09
 STREETFLOW TRAVELTIME(MIN) =   1.87   TC(MIN) =  25.00

   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.938
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   22.20
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   22.20   PEAK FLOW RATE(CFS) =     28.94
```

```
  END OF SUBAREA STREETFLOW HYDRAULICS:
  DEPTH(FEET) =  .67   HALFSTREET FLOODWIDTH(FEET) = 19.62
  FLOW VELOCITY(FEET/SEC.) =  3.12   DEPTH*VELOCITY =   2.09


****************************************************************************
  FLOW PROCESS FROM NODE   109.21 TO NODE   109.22 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.938
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   24.41
  EFFECTIVE AREA(ACRES) =   42.20
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =   42.20
  PEAK FLOW RATE(CFS) =   51.50
  TC(MIN) =  25.00


****************************************************************************
  FLOW PROCESS FROM NODE   109.22 TO NODE   109.23 IS CODE =   3
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  31.4 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =   6.7
  UPSTREAM NODE ELEVATION =  1311.00
  DOWNSTREAM NODE ELEVATION =  1309.00
  FLOWLENGTH(FEET) =   600.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    51.50
  TRAVEL TIME(MIN.) =   1.50    TC(MIN.) =  26.50


****************************************************************************
  FLOW PROCESS FROM NODE   109.31 TO NODE   109.23 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.871
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   46.42
  EFFECTIVE AREA(ACRES) =   82.20
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =   82.20
  PEAK FLOW RATE(CFS) =   95.40
  TC(MIN) =  26.50


****************************************************************************
  FLOW PROCESS FROM NODE   109.23 TO NODE   109.23 IS CODE =   1
```

```
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
========================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MINUTES) =  26.50
  RAINFALL INTENSITY (INCH./HOUR) =   1.87
  EFFECTIVE STREAM AREA(ACRES) =   82.20
  TOTAL STREAM AREA(ACRES) =   82.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     95.40

  CONFLUENCE INFORMATION:
  STREAM    PEAK FLOW    TIME    INTENSITY     FM     EFFECTIVE
  NUMBER    RATE(CFS)   (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
------------------------------------------------------------------
    1       361.44      27.86       1.816     .58       266.51
    2        95.40      26.50       1.871     .58        82.20

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.
  SUMMARY RESULTS:
  STREAM    CONFLUENCE    EFFECTIVE
  NUMBER      Q(CFS)     AREA(ACRES)
-----------------------------------------------
    1       452.74        348.71
    2       454.61        335.69
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    454.61   TIME(MINUTES) =   26.498
  EFFECTIVE AREA(ACRES) =    335.69
  TOTAL AREA(ACRES) =    379.30


************************************************************************
  FLOW PROCESS FROM NODE   109.23 TO NODE   109.24 IS CODE =   4
------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
========================================================================
  PIPEFLOW VELOCITY(FEET/SEC.) =  17.5
  UPSTREAM NODE ELEVATION =  1309.00
  DOWNSTREAM NODE ELEVATION =  1290.00
  FLOWLENGTH(FEET) =  1350.00   MANNINGS N =  .013
  GIVEN PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    454.61
  TRAVEL TIME(MIN.) =   1.29    TC(MIN.) =  27.78


************************************************************************
  FLOW PROCESS FROM NODE  1001.00 TO NODE   109.24 IS CODE =   8
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.819
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
```

```
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   44.53
 EFFECTIVE AREA(ACRES) =  375.69
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  419.30
 PEAK FLOW RATE(CFS) =  454.61
 TC(MIN) =  27.78

****************************************************************************
 FLOW PROCESS FROM NODE   109.24 TO NODE   109.24 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  27.78
 RAINFALL INTENSITY (INCH./HOUR) =   1.82
 EFFECTIVE STREAM AREA(ACRES) =  375.69
 TOTAL STREAM AREA(ACRES) =  419.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    454.61

****************************************************************************
 FLOW PROCESS FROM NODE  1001.00 TO NODE   109.24 IS CODE =   7
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  26.71   RAIN INTENSITY(INCH/HOUR) =  1.86
 EFFECTIVE AREA(ACRES) =    12.66
 TOTAL AREA(ACRES) =    12.66   PEAK FLOW RATE(CFS) =     20.58
 AVERAGED LOSS RATE, Fm(IN/HR) =   .582

****************************************************************************
 FLOW PROCESS FROM NODE   109.24 TO NODE   109.24 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MINUTES) =  26.71
 RAINFALL INTENSITY (INCH./HOUR) =   1.86
 EFFECTIVE STREAM AREA(ACRES) =   12.66
 TOTAL STREAM AREA(ACRES) =   12.66
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     20.58

 CONFLUENCE INFORMATION:
 STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
 NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
----------------------------------------------------------------------------
   1      454.61     27.78       1.819     .58      375.69
   2       20.58     26.71       1.863     .58       12.66

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

```
  SUMMARY RESULTS:
  STREAM    CONFLUENCE    EFFECTIVE
  NUMBER      Q(CFS)     AREA(ACRES)
-------------------------------------------
    1        474.49        388.35
    2        473.00        373.84
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    474.49   TIME(MINUTES) =   27.783
  EFFECTIVE AREA(ACRES) =    388.35
  TOTAL AREA(ACRES) =    431.96


****************************************************************************
  FLOW PROCESS FROM NODE   109.24 TO NODE   109.30 IS CODE =   3
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  DEPTH OF FLOW IN  69.0 INCH PIPE IS  51.7 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =  22.7
  UPSTREAM NODE ELEVATION =  1290.00
  DOWNSTREAM NODE ELEVATION =  1264.00
  FLOWLENGTH(FEET) =  1300.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    474.49
  TRAVEL TIME(MIN.) =    .95    TC(MIN.) =  28.74


****************************************************************************
  FLOW PROCESS FROM NODE  1002.00 TO NODE   109.30 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.783
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   43.22
  EFFECTIVE AREA(ACRES) =  428.35
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =  471.96
  PEAK FLOW RATE(CFS) =  474.49
  TC(MIN) =  28.74


****************************************************************************
  FLOW PROCESS FROM NODE   109.30 TO NODE   109.40 IS CODE =   3
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  58.7 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =  19.2
  UPSTREAM NODE ELEVATION =  1264.00
  DOWNSTREAM NODE ELEVATION =  1244.00
  FLOWLENGTH(FEET) =  1500.00   MANNINGS N =  .013
```

```
 ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    474.49
 TRAVEL TIME(MIN.) =   1.30    TC(MIN.) =  30.04

****************************************************************************
 FLOW PROCESS FROM NODE  1003.00 TO NODE   109.40 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.736
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   41.54
 EFFECTIVE AREA(ACRES) =  468.35
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  511.96
 PEAK FLOW RATE(CFS) =  486.39
 TC(MIN) =  30.04

****************************************************************************
 FLOW PROCESS FROM NODE   109.40 TO NODE   109.40 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  30.04
 RAINFALL INTENSITY (INCH./HOUR) =   1.74
 EFFECTIVE STREAM AREA(ACRES) =  468.35
 TOTAL STREAM AREA(ACRES) =  511.96
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    486.39

 CONFLUENCE INFORMATION:
 STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
 NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
----------------------------------------------------------------------------
   1      486.39     30.04       1.736     .58      468.35

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  1 STREAMS.
 SUMMARY RESULTS:
 STREAM   CONFLUENCE   EFFECTIVE
 NUMBER     Q(CFS)    AREA(ACRES)
-------------------------------------------
   1      486.39       468.35
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    486.39   TIME(MINUTES) =   30.037
 EFFECTIVE AREA(ACRES) =    468.35
 TOTAL AREA(ACRES) =    511.96
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =    511.96
 EFFECTIVE AREA(ACRES) =    468.35
```

PEAK FLOW RATE(CFS) = 486.39

END OF RATIONAL METHOD ANALYSIS

```
**********************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
          Copyright 1983,86,87 Advanced Engineering Software (aes)
             Ver. 4.1C  Release Date: 5/11/87  Serial # I00908

                          Especially prepared for:

                             HALL & FOREMAN
 ************************* DESCRIPTION OF STUDY *************************
* N.FONTANA MASTER S.D PLAN,W.FONTANA CHANNEL LATERAL 2,ALONG CYPRESS     *
* Q 25 YR, NOT FOR DESIGN                                                *
* VENKI.N, JN 3547, 5/12/89                                              *
 ************************************************************************

 FILE NAME: WFONLAT2.025
 TIME/DATE OF STUDY: 11:32   5/12/1989
 ========================================================================
 USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
 ========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

 USER SPECIFIED STORM EVENT(YEAR) =   25.00
 SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
 SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =  .95
 *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
 10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =   .970
 100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
 COMPUTED RAINFALL INTENSITY DATA:
 STORM EVENT =   25.00   1-HOUR INTENSITY(INCH/HOUR) = 1.1461
 SLOPE OF INTENSITY DURATION CURVE =  .6000


 **********************************************************************
 FLOW PROCESS FROM NODE   100.00 TO NODE   100.01 IS CODE =   2
 ----------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 ======================================================================
 DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH =  1000.00
 UPSTREAM ELEVATION =   1416.00
 DOWNSTREAM ELEVATION =   1395.00
 ELEVATION DIFFERENCE =     21.00
 TC =  .412*[( 1000.00** 3.00)/(    21.00)]** .20 =   14.140
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.728
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA RUNOFF(CFS) =     14.10
 TOTAL AREA(ACRES) =      7.30   PEAK FLOW RATE(CFS) =     14.10


 **********************************************************************
 FLOW PROCESS FROM NODE   100.01 TO NODE   101.01 IS CODE =   5
 ----------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
```

```
==========================================================================
 UPSTREAM NODE ELEVATION =   1395.00
 DOWNSTREAM NODE ELEVATION =   1385.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     14.10
 FLOW VELOCITY(FEET/SEC) =   3.48   FLOW DEPTH(FEET) =    .86
 TRAVEL TIME(MIN.) =   4.79   TC(MIN.) =  18.93

****************************************************************************
 FLOW PROCESS FROM NODE   101.00 TO NODE   101.01 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.290
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =    7.30   SUBAREA RUNOFF(CFS) =   11.22
 EFFECTIVE AREA(ACRES) =   14.60
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   14.60
 PEAK FLOW RATE(CFS) =   22.44
 TC(MIN) =  18.93

****************************************************************************
 FLOW PROCESS FROM NODE   101.10 TO NODE   101.10 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
 UPSTREAM NODE ELEVATION =   1385.00
 DOWNSTREAM NODE ELEVATION =   1363.60
 CHANNEL LENGTH THRU SUBAREA(FEET) =   700.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     22.44
 FLOW VELOCITY(FEET/SEC) =   5.82   FLOW DEPTH(FEET) =    .83
 TRAVEL TIME(MIN.) =   2.00   TC(MIN.) =  20.94

****************************************************************************
 FLOW PROCESS FROM NODE   100.10 TO NODE   101.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.156
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =    5.40   SUBAREA RUNOFF(CFS) =    7.65
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   20.00
 PEAK FLOW RATE(CFS) =   28.32
 TC(MIN) =  20.94

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

```
 FLOW PROCESS FROM NODE    101.10 TO NODE    102.10 IS CODE =    6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 'PSTREAM ELEVATION =    1363.60    DOWNSTREAM ELEVATION =    1363.20
 STREET LENGTH(FEET) =    300.00    CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
 INTERIOR STREET CROSSFALL(DECIMAL) =    .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =    .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

       **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =    28.32
 ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS:
       NOTE: STREETFLOW EXCEEDS TOP OF CURB.
       THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =    .82
       HALFSTREET FLOODWIDTH(FEET) =   20.00
       AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.83
       PRODUCT OF DEPTH&VELOCITY =    1.51
 STREETFLOW TRAVELTIME(MIN) =   2.73   TC(MIN) =  23.66

   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.003
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =      .00   SUBAREA RUNOFF(CFS) =      .00
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   20.00   PEAK FLOW RATE(CFS) =     28.32
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .82   HALFSTREET FLOODWIDTH(FEET) = 20.00
 FLOW VELOCITY(FEET/SEC.) =  1.83   DEPTH*VELOCITY =   1.51


****************************************************************************
 FLOW PROCESS FROM NODE    102.00 TO NODE    102.10 IS CODE =    8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.003
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =    20.00   SUBAREA RUNOFF(CFS) =   25.58
 EFFECTIVE AREA(ACRES) =   40.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   40.00
 PEAK FLOW RATE(CFS) =   51.15
 TC(MIN) =  23.66

 ****************************************************************************
 FLOW PROCESS FROM NODE    102.10 TO NODE    103.10 IS CODE =    3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==========================================================================
 DEPTH OF FLOW IN  63.0 INCH PIPE IS  49.7 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   2.8
 UPSTREAM NODE ELEVATION =  1363.20
 DOWNSTREAM NODE ELEVATION =  1362.00
 FLOWLENGTH(FEET) =   670.00   MANNINGS N =  .030
 ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =     51.15
 TRAVEL TIME(MIN.) =   4.00    TC(MIN.) =  27.67

**************************************************************************
 FLOW PROCESS FROM NODE   103.00 TO NODE   103.10 IS CODE =   8
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.824
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   44.70
 EFFECTIVE AREA(ACRES) =   80.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   80.00
 PEAK FLOW RATE(CFS) =   89.40
 TC(MIN) =  27.67
                    Q100 = 131.40,  Q100-25 = 42 CFS
                    Pro-rated Area = 25.56 Ac,  (Tc)100 = 26.38 min, Fm = 0.582

**************************************************************************
 FLOW PROCESS FROM NODE   103.10 TO NODE   104.22 IS CODE =   3
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
 DEPTH OF FLOW IN  51.0 INCH PIPE IS  36.4 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   8.2
 UPSTREAM NODE ELEVATION =  1362.00
 DOWNSTREAM NODE ELEVATION =  1359.00
 FLOWLENGTH(FEET) =   750.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =     89.40
 TRAVEL TIME(MIN.) =   1.52    TC(MIN.) =  29.18

**************************************************************************
 FLOW PROCESS FROM NODE   104.21 TO NODE   104.22 IS CODE =   8
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.766
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   42.63
 EFFECTIVE AREA(ACRES) =  120.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  120.00
 PEAK FLOW RATE(CFS) =  127.90
 TC(MIN) =  29.18

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

```
 FLOW PROCESS FROM NODE   104.22 TO NODE   104.10 IS CODE =   3
----------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 ======================================================================
 DEPTH OF FLOW IN  54.0 INCH PIPE IS  41.8 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   9.7
 UPSTREAM NODE ELEVATION =  1359.00
 DOWNSTREAM NODE ELEVATION =  1356.00
 FLOWLENGTH(FEET) =   600.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    127.90
 TRAVEL TIME(MIN.) =   1.03    TC(MIN.) =  30.21

**********************************************************************
 FLOW PROCESS FROM NODE   104.31 TO NODE   104.10 IS CODE =   8
----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.730
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   41.32
 EFFECTIVE AREA(ACRES) =  160.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  160.00
 PEAK FLOW RATE(CFS) =  165.29
 TC(MIN) =  30.21

**********************************************************************
 FLOW PROCESS FROM NODE   104.10 TO NODE   109.23 IS CODE =   3
----------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
======================================================================
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  36.1 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  16.3
 UPSTREAM NODE ELEVATION =  1356.00
 DOWNSTREAM NODE ELEVATION =  1311.00
 FLOWLENGTH(FEET) =  2700.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    165.29
 TRAVEL TIME(MIN.) =   2.76    TC(MIN.) =  32.97

**********************************************************************
 FLOW PROCESS FROM NODE   109.23 TO NODE   109.23 IS CODE =   1
----------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
======================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  32.97
 RAINFALL INTENSITY (INCH./HOUR) =   1.64
 EFFECTIVE STREAM AREA(ACRES) =  160.00
 TOTAL STREAM AREA(ACRES) =  160.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    165.29
```

```
****************************************************************************
 FLOW PROCESS FROM NODE   109.00 TO NODE   109.01 IS CODE =   2
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 ============================================================================
 DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH =  1000.00
 UPSTREAM ELEVATION =   1362.00
 DOWNSTREAM ELEVATION =   1345.00
 ELEVATION DIFFERENCE =     17.00
 TC =  .412*[( 1000.00** 3.00)/(    17.00)]** .20 =   14.751
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.660
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA RUNOFF(CFS) =      8.60
 TOTAL AREA(ACRES) =      4.60   PEAK FLOW RATE(CFS) =      8.60

****************************************************************************
 FLOW PROCESS FROM NODE   109.01 TO NODE   109.11 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1345.00
 DOWNSTREAM NODE ELEVATION =   1326.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =      8.60
 FLOW VELOCITY(FEET/SEC) =   3.84   FLOW DEPTH(FEET) =    .55
 TRAVEL TIME(MIN.) =   4.34   TC(MIN.) =  19.09

****************************************************************************
 FLOW PROCESS FROM NODE   109.10 TO NODE   109.11 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.279
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =    4.60   SUBAREA RUNOFF(CFS) =    7.02
 EFFECTIVE AREA(ACRES) =    9.20
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =    9.20
 PEAK FLOW RATE(CFS) =   14.05
 TC(MIN) =  19.09

****************************************************************************
 FLOW PROCESS FROM NODE   109.11 TO NODE   109.02 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1326.00
 DOWNSTREAM NODE ELEVATION =   1314.30
```

```
 CHANNEL LENGTH THRU SUBAREA(FEET) =   650.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     14.05
 'LOW VELOCITY(FEET/SEC) =   4.28   FLOW DEPTH(FEET) =    .73
 TRAVEL TIME(MIN.) =   2.53   TC(MIN.) =  21.62

****************************************************************************
 FLOW PROCESS FROM NODE   109.20 TO NODE   109.02 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.115
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =    3.00   SUBAREA RUNOFF(CFS) =    4.14
 EFFECTIVE AREA(ACRES) =   12.20
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   12.20
 PEAK FLOW RATE(CFS) =   16.83
 TC(MIN) =  21.62

****************************************************************************
 FLOW PROCESS FROM NODE   109.02 TO NODE   109.12 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1314.30   DOWNSTREAM ELEVATION =   1313.50
 ;TREET LENGTH(FEET) =   200.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 32.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  24.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   16.83
   STREETFLOW MODEL RESULTS:
      STREET FLOWDEPTH(FEET) =   .63
      HALFSTREET FLOODWIDTH(FEET) =   17.37
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.21
      PRODUCT OF DEPTH&VELOCITY =    1.38
 STREETFLOW TRAVELTIME(MIN) =   1.51   TC(MIN) =  23.13

   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.031
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   12.20
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   12.20   PEAK FLOW RATE(CFS) =    16.83
 END OF SUBAREA STREETFLOW HYDRAULICS:
 )EPTH(FEET) =  .63   HALFSTREET FLOODWIDTH(FEET) = 17.37
 FLOW VELOCITY(FEET/SEC.) =  2.21   DEPTH*VELOCITY =   1.38

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

```
 FLOW PROCESS FROM NODE   109.30 TO NODE   109.12 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.031
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   10.00   SUBAREA RUNOFF(CFS) =   13.04
 EFFECTIVE AREA(ACRES) =   22.20
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   22.20
 PEAK FLOW RATE(CFS) =   28.94
 TC(MIN) =  23.13

****************************************************************************
 FLOW PROCESS FROM NODE   109.12 TO NODE   109.22 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1313.50   DOWNSTREAM ELEVATION =   1311.00
 STREET LENGTH(FEET) =   350.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 32.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  24.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   28.94
   STREETFLOW MODEL RESULTS:
      NOTE: STREETFLOW EXCEEDS TOP OF CURB.
      THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .67
      HALFSTREET FLOODWIDTH(FEET) =   19.62
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.12
      PRODUCT OF DEPTH&VELOCITY =    2.09
 STREETFLOW TRAVELTIME(MIN) =   1.87   TC(MIN) =  25.00

   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.938
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   22.20
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   22.20   PEAK FLOW RATE(CFS) =     28.94
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .67   HALFSTREET FLOODWIDTH(FEET) = 19.62
 FLOW VELOCITY(FEET/SEC.) =  3.12   DEPTH*VELOCITY =   2.09

****************************************************************************
 FLOW PROCESS FROM NODE   109.21 TO NODE   109.22 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.938
```

```
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   24.41
 EFFECTIVE AREA(ACRES) =   42.20
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   42.20
 PEAK FLOW RATE(CFS) =   51.50
 TC(MIN) =  25.00


****************************************************************************
 FLOW PROCESS FROM NODE   109.22 TO NODE   109.23 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  31.4 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   6.7
 UPSTREAM NODE ELEVATION =  1311.00
 DOWNSTREAM NODE ELEVATION =  1309.00
 FLOWLENGTH(FEET) =   600.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    51.50
 TRAVEL TIME(MIN.) =   1.50    TC(MIN.) =  26.50


****************************************************************************
 FLOW PROCESS FROM NODE   109.31 TO NODE   109.23 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 ============================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.871
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   46.42
 EFFECTIVE AREA(ACRES) =   82.20
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   82.20
 PEAK FLOW RATE(CFS) =   95.40
 TC(MIN) =  26.50


****************************************************************************
 FLOW PROCESS FROM NODE   109.23 TO NODE   109.23 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MINUTES) =  26.50
 RAINFALL INTENSITY (INCH./HOUR) =   1.87
 EFFECTIVE STREAM AREA(ACRES) =   82.20
 TOTAL STREAM AREA(ACRES) =   82.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     95.40

 CONFLUENCE INFORMATION:
 STREAM    PEAK FLOW    TIME    INTENSITY     FM     EFFECTIVE
 NUMBER    RATE(CFS)   (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
----------------------------------------------------------------
   1       165.29      32.97       1.641      .58       160.00
```

```
    2        95.40      26.50        1.871       .58        82.20

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.
 SUMMARY RESULTS:
 STREAM    CONFLUENCE    EFFECTIVE
 NUMBER      Q(CFS)     AREA(ACRES)
 ---------------------------------------------
   1        243.66        242.20
   2        257.07        210.78
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    257.07   TIME(MINUTES) =   26.498
 EFFECTIVE AREA(ACRES) =    210.78
 TOTAL AREA(ACRES) =    242.20

****************************************************************************
 FLOW PROCESS FROM NODE   109.23 TO NODE   109.24 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  45.7 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  16.9
 UPSTREAM NODE ELEVATION =  1309.00
 DOWNSTREAM NODE ELEVATION =  1290.00
 FLOWLENGTH(FEET) =  1350.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    257.07
 TRAVEL TIME(MIN.) =   1.33    TC(MIN.) =  27.83

****************************************************************************
 FLOW PROCESS FROM NODE  1001.00 TO NODE   109.24 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.817
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   44.47
 EFFECTIVE AREA(ACRES) =  250.78
 AVERAGED Fm(INCH/HR) =   .582          Q100 = 65.05,
 TOTAL AREA(ACRES) =  282.20                          Q100-25 = 20.58 cfs
 PEAK FLOW RATE(CFS) =  278.80          Pro. retail Area: 12.66 Ac
 TC(MIN) =  27.83                       Tc100 = 26.7', Fm= 0.5820

****************************************************************************
 FLOW PROCESS FROM NODE   109.24 TO NODE   109.30 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  41.9 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  20.0
 UPSTREAM NODE ELEVATION =  1290.00
 DOWNSTREAM NODE ELEVATION =  1264.00
 FLOWLENGTH(FEET) =  1300.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
```

```
PIPEFLOW THRU SUBAREA(CFS) =    278.80
TRAVEL TIME(MIN.) =   1.09    TC(MIN.) =  28.92

****************************************************************************
FLOW PROCESS FROM NODE  1002.00 TO NODE   109.30 IS CODE =   8
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.776
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   42.98
EFFECTIVE AREA(ACRES) =  290.78
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =  322.20
PEAK FLOW RATE(CFS) =  312.48
TC(MIN) =  28.92

****************************************************************************
FLOW PROCESS FROM NODE   109.30 TO NODE   109.40 IS CODE =   3
----------------------------------------------------------------------------
>>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
DEPTH OF FLOW IN  63.0 INCH PIPE IS  48.4 INCHES
PIPEFLOW VELOCITY(FEET/SEC.) =  17.5
UPSTREAM NODE ELEVATION =  1264.00
DOWNSTREAM NODE ELEVATION =  1244.00
FLOWLENGTH(FEET) =  1500.00   MANNINGS N =  .013
ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
PIPEFLOW THRU SUBAREA(CFS) =   312.48
TRAVEL TIME(MIN.) =   1.43    TC(MIN.) =  30.34

****************************************************************************
FLOW PROCESS FROM NODE  1003.00 TO NODE   109.40 IS CODE =   8
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.725
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   41.16
EFFECTIVE AREA(ACRES) =  330.78
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =  362.20
PEAK FLOW RATE(CFS) =  340.40
TC(MIN) =  30.34

****************************************************************************
FLOW PROCESS FROM NODE   109.40 TO NODE   109.40 IS CODE =   1
----------------------------------------------------------------------------
>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MINUTES) =  30.34
```

RAINFALL INTENSITY (INCH./HOUR) = 1.73
EFFECTIVE STREAM AREA(ACRES) = 330.78
TOTAL STREAM AREA(ACRES) = 362.20
PEAK FLOW RATE(CFS) AT CONFLUENCE = 340.40

CONFLUENCE INFORMATION:

STREAM NUMBER	PEAK FLOW RATE(CFS)	TIME (MIN.)	INTENSITY (INCH/HOUR)	FM (IN/HR)	EFFECTIVE AREA(ACRES)
1	340.40	30.34	1.725	.58	330.78

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 1 STREAMS.
SUMMARY RESULTS:

STREAM NUMBER	CONFLUENCE Q(CFS)	EFFECTIVE AREA(ACRES)
1	340.40	330.78

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 340.40 TIME(MINUTES) = 30.341
EFFECTIVE AREA(ACRES) = 330.78
TOTAL AREA(ACRES) = 362.20

==========

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 362.20
EFFECTIVE AREA(ACRES) = 330.78
PEAK FLOW RATE(CFS) = 340.40

==========

END OF RATIONAL METHOD ANALYSIS

```
**********************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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             Ver. 4.1C  Release Date: 5/11/87  Serial # I00908

                          Especially prepared for:

                            HALL & FOREMAN
 ************************* DESCRIPTION OF STUDY *************************
* N.FONTANA MASTER S.D PLAN,W.FONTANA CHANNEL LATERAL 2,ALONG CYPRESS      *
* Q 100 YR, NOT DESIGN Q                                                  *
* VENKI.N, JN 3547, 5/12/89                                               *
 ************************************************************************

 FILE NAME: WFONLAT2.100
 TIME/DATE OF STUDY: 11:22   5/12/1989
========================================================================
 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 =  .95
 *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
 10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =   .970
 100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
 COMPUTED RAINFALL INTENSITY DATA:
 STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) = 1.4700
 SLOPE OF INTENSITY DURATION CURVE =  .6000


**********************************************************************
 FLOW PROCESS FROM NODE   100.00 TO NODE   100.01 IS CODE =   2
----------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
======================================================================
 DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH =  1000.00
 UPSTREAM ELEVATION =   1416.00
 DOWNSTREAM ELEVATION =   1395.00
 ELEVATION DIFFERENCE =     21.00
 TC =  .412*[( 1000.00** 3.00)/(    21.00)]** .20 =   14.140
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.499
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA RUNOFF(CFS) =     19.16
 TOTAL AREA(ACRES) =      7.30   PEAK FLOW RATE(CFS) =     19.16

 **********************************************************************
 FLOW PROCESS FROM NODE   100.01 TO NODE   101.01 IS CODE =   5
----------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
```

```
==========================================================================
 UPSTREAM NODE ELEVATION =   1395.00
 DOWNSTREAM NODE ELEVATION =   1385.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     19.16
 FLOW VELOCITY(FEET/SEC) =   3.75   FLOW DEPTH(FEET) =   1.02
 TRAVEL TIME(MIN.) =   4.44   TC(MIN.) =  18.58

**************************************************************************
 FLOW PROCESS FROM NODE   101.00 TO NODE   101.01 IS CODE =   8
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.970
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =    7.30   SUBAREA RUNOFF(CFS) =   15.69
 EFFECTIVE AREA(ACRES) =   14.60
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   14.60
 PEAK FLOW RATE(CFS) =   31.38
 TC(MIN) =  18.58

**************************************************************************
 FLOW PROCESS FROM NODE   101.10 TO NODE   101.10 IS CODE =   5
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
 UPSTREAM NODE ELEVATION =   1385.00
 DOWNSTREAM NODE ELEVATION =   1363.60
 CHANNEL LENGTH THRU SUBAREA(FEET) =   700.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     31.38
 FLOW VELOCITY(FEET/SEC) =   6.41   FLOW DEPTH(FEET) =    .98
 TRAVEL TIME(MIN.) =   1.82   TC(MIN.) =  20.40

**************************************************************************
 FLOW PROCESS FROM NODE   100.10 TO NODE   101.10 IS CODE =   8
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.808
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =    5.40   SUBAREA RUNOFF(CFS) =   10.82
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   20.00
 PEAK FLOW RATE(CFS) =   40.07
 TC(MIN) =  20.40

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

```
 FLOW PROCESS FROM NODE   101.10 TO NODE   102.10 IS CODE =   6
----------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
======================================================================
 UPSTREAM ELEVATION =   1363.60   DOWNSTREAM ELEVATION =   1363.20
 STREET LENGTH(FEET) =   300.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   40.07
 ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS:
      NOTE: STREETFLOW EXCEEDS TOP OF CURB.
      THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .90
      HALFSTREET FLOODWIDTH(FEET) =   20.00
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.16
      PRODUCT OF DEPTH&VELOCITY =    1.95
 STREETFLOW TRAVELTIME(MIN) =   2.32   TC(MIN) =  22.72

  100 YEAR RAINFALL INTENSITY(INCH/HOUR) = 2.633
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   20.00   PEAK FLOW RATE(CFS) =    40.07
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .90   HALFSTREET FLOODWIDTH(FEET) = 20.00
 FLOW VELOCITY(FEET/SEC.) =  2.16   DEPTH*VELOCITY =   1.95

**********************************************************************
 FLOW PROCESS FROM NODE   102.00 TO NODE   102.10 IS CODE =   8
----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.633
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   36.91
 EFFECTIVE AREA(ACRES) =   40.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   40.00
 PEAK FLOW RATE(CFS) =   73.82
 TC(MIN) =  22.72

**********************************************************************
 FLOW PROCESS FROM NODE   102.10 TO NODE   103.10 IS CODE =   3
----------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==========================================================================
 DEPTH OF FLOW IN  72.0 INCH PIPE IS  57.5 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   3.1
 UPSTREAM NODE ELEVATION =  1363.20
 DOWNSTREAM NODE ELEVATION =  1362.00
 FLOWLENGTH(FEET) =   670.00   MANNINGS N =  .030
 ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =     73.82
 TRAVEL TIME(MIN.) =   3.66    TC(MIN.) =  26.38

**************************************************************************
 FLOW PROCESS FROM NODE   103.00 TO NODE   103.10 IS CODE =   8
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.407
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   65.69
 EFFECTIVE AREA(ACRES) =   80.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   80.00
 PEAK FLOW RATE(CFS) =  131.39      Qvalc = 1.643
 TC(MIN) =  26.38

**************************************************************************
 FLOW PROCESS FROM NODE   103.10 TO NODE   104.22 IS CODE =   3
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  43.8 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   9.0
 UPSTREAM NODE ELEVATION =  1362.00
 DOWNSTREAM NODE ELEVATION =  1359.00
 FLOWLENGTH(FEET) =   750.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    131.39
 TRAVEL TIME(MIN.) =   1.39    TC(MIN.) =  27.77

**************************************************************************
 FLOW PROCESS FROM NODE   104.21 TO NODE   104.22 IS CODE =   8
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.334
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   63.06
 EFFECTIVE AREA(ACRES) =  120.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  120.00
 PEAK FLOW RATE(CFS) =  189.19
 TC(MIN) =  27.77

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

```
 FLOW PROCESS FROM NODE   104.22 TO NODE   104.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  63.0 INCH PIPE IS  47.9 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  10.7
 UPSTREAM NODE ELEVATION =  1359.00
 DOWNSTREAM NODE ELEVATION =  1356.00
 FLOWLENGTH(FEET) =   600.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   189.19
 TRAVEL TIME(MIN.) =    .93    TC(MIN.) =  28.70

****************************************************************************
 FLOW PROCESS FROM NODE   104.31 TO NODE   104.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.288
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   61.41
 EFFECTIVE AREA(ACRES) =  160.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  160.00
 PEAK FLOW RATE(CFS) =  245.66
 TC(MIN) =  28.70

****************************************************************************
 FLOW PROCESS FROM NODE   104.10 TO NODE   109.23 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  54.0 INCH PIPE IS  43.9 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  17.7
 UPSTREAM NODE ELEVATION =  1356.00
 DOWNSTREAM NODE ELEVATION =  1311.00
 FLOWLENGTH(FEET) =  2700.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   245.66
 TRAVEL TIME(MIN.) =   2.54    TC(MIN.) =  31.24

****************************************************************************
 FLOW PROCESS FROM NODE   109.23 TO NODE   109.23 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  31.24
 RAINFALL INTENSITY (INCH./HOUR) =   2.17
 EFFECTIVE STREAM AREA(ACRES) =  160.00
 TOTAL STREAM AREA(ACRES) =  160.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =   245.66
```

```
**********************************************************************
 FLOW PROCESS FROM NODE    109.00 TO NODE    109.01 IS CODE =    2
----------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 ======================================================================
 DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH =  1000.00
 UPSTREAM ELEVATION =    1362.00
 DOWNSTREAM ELEVATION =    1345.00
 ELEVATION DIFFERENCE =      17.00
 TC =  .412*[( 1000.00** 3.00)/(    17.00)]** .20 =    14.751
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.411
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA RUNOFF(CFS) =      11.71
 TOTAL AREA(ACRES) =      4.60   PEAK FLOW RATE(CFS) =     11.71

**********************************************************************
 FLOW PROCESS FROM NODE    109.01 TO NODE    109.11 IS CODE =    5
----------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
======================================================================
 UPSTREAM NODE ELEVATION =    1345.00
 DOWNSTREAM NODE ELEVATION =    1326.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =     3.00    "Z" FACTOR =    2.000
 MANNINGS FACTOR =  .030    MAXIMUM DEPTH(FEET) =    2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =      11.71
 FLOW VELOCITY(FEET/SEC) =    4.27    FLOW DEPTH(FEET) =     .64
 TRAVEL TIME(MIN.) =    3.90    TC(MIN.) =  18.65

**********************************************************************
 FLOW PROCESS FROM NODE    109.10 TO NODE    109.11 IS CODE =    8
----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.963
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =     4.60   SUBAREA RUNOFF(CFS) =     9.86
 EFFECTIVE AREA(ACRES) =     9.20
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =     9.20
 PEAK FLOW RATE(CFS) =    19.72
 TC(MIN) =  18.65

**********************************************************************
 FLOW PROCESS FROM NODE    109.11 TO NODE    109.02 IS CODE =    5
----------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
======================================================================
 UPSTREAM NODE ELEVATION =    1326.00
 DOWNSTREAM NODE ELEVATION =    1314.30
```

```
CHANNEL LENGTH THRU SUBAREA(FEET) =   650.00
CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
CHANNEL FLOW THRU SUBAREA(CFS) =     19.72
FLOW VELOCITY(FEET/SEC) =   4.63   FLOW DEPTH(FEET) =    .89
TRAVEL TIME(MIN.) =   2.34   TC(MIN.) =  20.99

****************************************************************************
FLOW PROCESS FROM NODE   109.20 TO NODE   109.02 IS CODE =   8
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.760
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
SUBAREA AREA(ACRES) =    3.00   SUBAREA RUNOFF(CFS) =    5.88
EFFECTIVE AREA(ACRES) =   12.20
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =   12.20
PEAK FLOW RATE(CFS) =   23.92
TC(MIN) =  20.99

****************************************************************************
FLOW PROCESS FROM NODE   109.02 TO NODE   109.12 IS CODE =   6
----------------------------------------------------------------------------
>>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
UPSTREAM ELEVATION =   1314.30   DOWNSTREAM ELEVATION =   1313.50
STREET LENGTH(FEET) =   200.00   CURB HEIGTH(INCHES) = 8.
STREET HALFWIDTH(FEET) = 32.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  24.00
INTERIOR STREET CROSSFALL(DECIMAL) =   .020
OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

     **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   23.92
  STREETFLOW MODEL RESULTS:
     NOTE: STREETFLOW EXCEEDS TOP OF CURB.
     THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .69
     HALFSTREET FLOODWIDTH(FEET) =   20.37
     AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.42
     PRODUCT OF DEPTH&VELOCITY =    1.66
STREETFLOW TRAVELTIME(MIN) =   1.38   TC(MIN) =  22.37

 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.657
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
EFFECTIVE AREA(ACRES) =   12.20
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =   12.20   PEAK FLOW RATE(CFS) =    23.92
END OF SUBAREA STREETFLOW HYDRAULICS:
DEPTH(FEET) =  .69   HALFSTREET FLOODWIDTH(FEET) = 20.37
```

```
 FLOW VELOCITY(FEET/SEC.) =  2.42   DEPTH*VELOCITY =   1.66

****************************************************************************
 FLOW PROCESS FROM NODE   109.30 TO NODE   109.12 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.657
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   10.00   SUBAREA RUNOFF(CFS) =   18.68
 EFFECTIVE AREA(ACRES) =   22.20
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   22.20
 PEAK FLOW RATE(CFS) =   41.46
 TC(MIN) =  22.37

****************************************************************************
 FLOW PROCESS FROM NODE   109.12 TO NODE   109.22 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1313.50   DOWNSTREAM ELEVATION =   1311.00
 STREET LENGTH(FEET) =   350.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 32.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  24.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   41.46
   STREETFLOW MODEL RESULTS:
      NOTE: STREETFLOW EXCEEDS TOP OF CURB.
      THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .75
      HALFSTREET FLOODWIDTH(FEET) =   23.37
      AVERAGE FLOW VELOCITY(FEET/SEC.) =   3.32
      PRODUCT OF DEPTH&VELOCITY =   2.47
 STREETFLOW TRAVELTIME(MIN) =   1.76   TC(MIN) =  24.13

  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.539
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =    .00   SUBAREA RUNOFF(CFS) =    .00
 EFFECTIVE AREA(ACRES) =   22.20
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   22.20   PEAK FLOW RATE(CFS) =   41.46
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .75   HALFSTREET FLOODWIDTH(FEET) = 23.37
 FLOW VELOCITY(FEET/SEC.) =  3.32   DEPTH*VELOCITY =   2.47

****************************************************************************
 FLOW PROCESS FROM NODE   109.21 TO NODE   109.22 IS CODE =   8
```

```
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.539
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   35.23
EFFECTIVE AREA(ACRES) =   42.20
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =   42.20
PEAK FLOW RATE(CFS) =   74.33
TC(MIN) =  24.13

****************************************************************************
FLOW PROCESS FROM NODE   109.22 TO NODE   109.23 IS CODE =   3
----------------------------------------------------------------------------
>>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
DEPTH OF FLOW IN  48.0 INCH PIPE IS  36.3 INCHES
PIPEFLOW VELOCITY(FEET/SEC.) =   7.3
UPSTREAM NODE ELEVATION =  1311.00
DOWNSTREAM NODE ELEVATION =  1309.00
FLOWLENGTH(FEET) =   600.00   MANNINGS N =  .013
ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
PIPEFLOW THRU SUBAREA(CFS) =    74.33
TRAVEL TIME(MIN.) =   1.37    TC(MIN.) =  25.50

****************************************************************************
FLOW PROCESS FROM NODE   109.31 TO NODE   109.23 IS CODE =   8
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.456
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   67.48
EFFECTIVE AREA(ACRES) =   82.20
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =   82.20
PEAK FLOW RATE(CFS) =  138.66
TC(MIN) =  25.50

****************************************************************************
FLOW PROCESS FROM NODE   109.23 TO NODE   109.23 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==========================================================================
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MINUTES) =  25.50
RAINFALL INTENSITY (INCH./HOUR) =   2.46
EFFECTIVE STREAM AREA(ACRES) =   82.20
TOTAL STREAM AREA(ACRES) =   82.20
PEAK FLOW RATE(CFS) AT CONFLUENCE =    138.66

CONFLUENCE INFORMATION:
```

```
 STREAM    PEAK FLOW    TIME    INTENSITY     FM     EFFECTIVE
 NUMBER    RATE(CFS)   (MIN.)  (INCH/HOUR)  (IN/HR) AREA(ACRES)
------------------------------------------------------------------
   1        245.66      31.24       2.175      .58       160.00
   2        138.66      25.50       2.456      .58        82.20

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.
 SUMMARY RESULTS:
 STREAM    CONFLUENCE    EFFECTIVE
 NUMBER      Q(CFS)     AREA(ACRES)
-----------------------------------------------
   1        363.48        242.20
   2        374.65        212.80
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    374.65   TIME(MINUTES) =   25.500
 EFFECTIVE AREA(ACRES) =    212.80
 TOTAL AREA(ACRES) =    242.20

****************************************************************************
 FLOW PROCESS FROM NODE   109.23 TO NODE   109.24 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  66.0 INCH PIPE IS  52.1 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  18.6
 UPSTREAM NODE ELEVATION =  1309.00
 DOWNSTREAM NODE ELEVATION =  1290.00
 FLOWLENGTH(FEET) =  1350.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    374.65
 TRAVEL TIME(MIN.) =   1.21    TC(MIN.) =  26.71

****************************************************************************
 FLOW PROCESS FROM NODE  1001.00 TO NODE   109.24 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.389
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   65.05
 EFFECTIVE AREA(ACRES) =  252.80
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  282.20
 PEAK FLOW RATE(CFS) =  411.13
 TC(MIN) =  26.71

****************************************************************************
 FLOW PROCESS FROM NODE   109.24 TO NODE   109.30 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  66.0 INCH PIPE IS  48.4 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  22.0
```

$Q_{water} = 1.626$ cfs/Ac

```
UPSTREAM NODE ELEVATION =  1290.00
DOWNSTREAM NODE ELEVATION =  1264.00
FLOWLENGTH(FEET) =  1300.00   MANNINGS N =  .013
ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
'IPEFLOW THRU SUBAREA(CFS) =    411.13
TRAVEL TIME(MIN.) =    .98    TC(MIN.) =  27.69

****************************************************************************
FLOW PROCESS FROM NODE  1002.00 TO NODE   109.30 IS CODE =   8
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.338
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   63.21
EFFECTIVE AREA(ACRES) =  292.80
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =  322.20
PEAK FLOW RATE(CFS) =  462.66
TC(MIN) =  27.69

****************************************************************************
FLOW PROCESS FROM NODE   109.30 TO NODE   109.40 IS CODE =   3
----------------------------------------------------------------------------
>>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
)EPTH OF FLOW IN  72.0 INCH PIPE IS  57.2 INCHES
PIPEFLOW VELOCITY(FEET/SEC.) =  19.2
UPSTREAM NODE ELEVATION =  1264.00
DOWNSTREAM NODE ELEVATION =  1244.00
FLOWLENGTH(FEET) =  1500.00   MANNINGS N =  .013
ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
PIPEFLOW THRU SUBAREA(CFS) =    462.66
TRAVEL TIME(MIN.) =   1.30    TC(MIN.) =  28.99

****************************************************************************
FLOW PROCESS FROM NODE  1003.00 TO NODE   109.40 IS CODE =   8
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.274
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   60.92
EFFECTIVE AREA(ACRES) =  332.80
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =  362.20
PEAK FLOW RATE(CFS) =  506.83
TC(MIN) =  28.99

****************************************************************************
FLOW PROCESS FROM NODE   109.40 TO NODE   109.40 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MINUTES) =  28.99
'AINFALL INTENSITY (INCH./HOUR) =   2.27
EFFECTIVE STREAM AREA(ACRES) =  332.80
TOTAL STREAM AREA(ACRES) =  362.20
PEAK FLOW RATE(CFS) AT CONFLUENCE =    506.83

CONFLUENCE INFORMATION:
STREAM    PEAK FLOW    TIME    INTENSITY     FM     EFFECTIVE
NUMBER    RATE(CFS)   (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
--------------------------------------------------------------------
  1       506.83      28.99       2.274      .58       332.80

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR  1 STREAMS.
SUMMARY RESULTS:
STREAM    CONFLUENCE    EFFECTIVE
NUMBER      Q(CFS)     AREA(ACRES)
--------------------------------------------
  1       506.83        332.80
COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =    506.83   TIME(MINUTES) =   28.994
EFFECTIVE AREA(ACRES) =    332.80
TOTAL AREA(ACRES) =    362.20
================================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)      =    362.20
EFFECTIVE AREA(ACRES) =    332.80
'EAK FLOW RATE(CFS)    =    506.83
================================================================================
END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        Copyright 1983,86,87 Advanced Engineering Software (aes)
           Ver. 4.1C  Release Date: 5/11/87  Serial # I00908

                        Especially prepared for:

                             HALL & FOREMAN
 ************************** DESCRIPTION OF STUDY **********************
* N. FONTANA MASTER S.D. PLAN, W. FONTANA CHANNEL LAT. 3, ALONG OLEANDE
* Q 100-25, DESIGN Q, INCLUDES OVERFLOW FROM BASELINE S.D.
* JN 3547
 **************************************************************************

  FILE NAME: WFONLAT3.DAT
  TIME/DATE OF STUDY:  7:48   1/ 1/1980
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =   .970
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   25.00   1-HOUR INTENSITY(INCH/HOUR) = 1.1461
  SLOPE OF INTENSITY DURATION CURVE =  .6000



**************************************************************************
  FLOW PROCESS FROM NODE   115.00 TO NODE   115.01 IS CODE =   2
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

  TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
  INITIAL SUBAREA FLOW-LENGTH =  1000.00
  UPSTREAM ELEVATION =   1408.00
  DOWNSTREAM ELEVATION =   1385.00
  ELEVATION DIFFERENCE =     23.00
  TC =  .412*[( 1000.00** 3.00)/(    23.00)]** .20 =   13.885
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.758
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA RUNOFF(CFS) =     13.90
  TOTAL AREA(ACRES) =      7.10   PEAK FLOW RATE(CFS) =     13.90
```

```
****************************************************************************
 FLOW PROCESS FROM NODE   115.01 TO NODE   115.02 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1385.00
 DOWNSTREAM NODE ELEVATION =   1369.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     13.90
 FLOW VELOCITY(FEET/SEC) =   4.01   FLOW DEPTH(FEET) =    .77
 TRAVEL TIME(MIN.) =   4.16   TC(MIN.) =  18.04


****************************************************************************
 FLOW PROCESS FROM NODE   115.10 TO NODE   115.02 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.357
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =    7.10   SUBAREA RUNOFF(CFS) =   11.34
 EFFECTIVE AREA(ACRES) =   14.20
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   14.20
 PEAK FLOW RATE(CFS) =   22.68
 TC(MIN) =  18.04


****************************************************************************
 FLOW PROCESS FROM NODE   115.02 TO NODE   116.10 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1369.00
 DOWNSTREAM NODE ELEVATION =   1354.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   700.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     22.68
 FLOW VELOCITY(FEET/SEC) =   5.33   FLOW DEPTH(FEET) =    .89
 TRAVEL TIME(MIN.) =   2.19   TC(MIN.) =  20.23


****************************************************************************
 FLOW PROCESS FROM NODE   116.00 TO NODE   116.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.200
 SOIL CLASSIFICATION IS "A"
```

```
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     5.00   SUBAREA RUNOFF(CFS) =     7.28
 EFFECTIVE AREA(ACRES) =   19.20
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =    19.20
 PEAK FLOW RATE(CFS) =   27.96
 TC(MIN) =  20.23


****************************************************************************
 FLOW PROCESS FROM NODE   116.10 TO NODE   117.10 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1354.00   DOWNSTREAM ELEVATION =   1352.00
 STREET LENGTH(FEET) =   320.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
 INTERIOR STREET CROSSFALL(DECIMAL) =    .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =    .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   27.96
   STREETFLOW MODEL RESULTS:
      NOTE: STREETFLOW EXCEEDS TOP OF CURB.
      THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .67
      HALFSTREET FLOODWIDTH(FEET) =   19.63
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.01
      PRODUCT OF DEPTH&VELOCITY =    2.02
 STREETFLOW TRAVELTIME(MIN) =   1.77   TC(MIN) =  22.00

  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.092
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =      .00   SUBAREA RUNOFF(CFS) =      .00
 EFFECTIVE AREA(ACRES) =   19.20
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =   19.20   PEAK FLOW RATE(CFS) =     27.96
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .67   HALFSTREET FLOODWIDTH(FEET) = 19.63
 FLOW VELOCITY(FEET/SEC.) =  3.01   DEPTH*VELOCITY =   2.02


****************************************************************************
 FLOW PROCESS FROM NODE   117.00 TO NODE   117.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.092
 SOIL CLASSIFICATION IS "A"
```

```
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   19.00   SUBAREA RUNOFF(CFS) =   25.83
 EFFECTIVE AREA(ACRES) =   38.20
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   38.20
 PEAK FLOW RATE(CFS) =   51.92
 TC(MIN) =  22.00


****************************************************************************
 FLOW PROCESS FROM NODE   117.10 TO NODE   118.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  33.6 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   6.3
 UPSTREAM NODE ELEVATION =  1352.00
 DOWNSTREAM NODE ELEVATION =  1350.00
 FLOWLENGTH(FEET) =   680.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    51.92
 TRAVEL TIME(MIN.) =   1.80    TC(MIN.) =  23.80


****************************************************************************
 FLOW PROCESS FROM NODE   118.00 TO NODE   118.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.996
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   41.00   SUBAREA RUNOFF(CFS) =   52.17
 EFFECTIVE AREA(ACRES) =   79.20
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   79.20
 PEAK FLOW RATE(CFS) =  100.78
 TC(MIN) =  23.80


****************************************************************************
 FLOW PROCESS FROM NODE   118.10 TO NODE   118.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  23.80
 RAINFALL INTENSITY (INCH./HOUR) =   2.00
 EFFECTIVE STREAM AREA(ACRES) =   79.20
 TOTAL STREAM AREA(ACRES) =   79.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    100.78


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

```
 FLOW PROCESS FROM NODE   213.10 TO NODE   213.10 IS CODE =   7
----------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  18.60   RAIN INTENSITY(INCH/HOUR) =  2.31
 EFFECTIVE AREA(ACRES) =    44.70
 TOTAL AREA(ACRES) =    44.70   PEAK FLOW RATE(CFS) =     93.00
 AVERAGED LOSS RATE, Fm(IN/HR) =   .582


****************************************************************
 FLOW PROCESS FROM NODE   213.10 TO NODE   118.10 IS CODE =   6
----------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
================================================================
 UPSTREAM ELEVATION =   1403.00   DOWNSTREAM ELEVATION =   1350.00
 STREET LENGTH(FEET) =  2760.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

       **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   93.00
 ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS:
       NOTE: STREETFLOW EXCEEDS TOP OF CURB.
       THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .79
       HALFSTREET FLOODWIDTH(FEET) =   20.00
       AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.70
       PRODUCT OF DEPTH&VELOCITY =    5.27
 STREETFLOW TRAVELTIME(MIN) =   6.86   TC(MIN) =  25.46

   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.917
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   44.70
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   44.70   PEAK FLOW RATE(CFS) =    93.00
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .79   HALFSTREET FLOODWIDTH(FEET) = 20.00
 FLOW VELOCITY(FEET/SEC.) =  6.70   DEPTH*VELOCITY =   5.27


****************************************************************
 FLOW PROCESS FROM NODE   118.10 TO NODE   118.10 IS CODE =   1
----------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==========================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MINUTES) =  25.46
  RAINFALL INTENSITY (INCH./HOUR) =   1.92
  EFFECTIVE STREAM AREA(ACRES) =   44.70
  TOTAL STREAM AREA(ACRES) =   44.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     93.00

  CONFLUENCE INFORMATION:
  STREAM   PEAK FLOW   TIME   INTENSITY    FM     EFFECTIVE
  NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
--------------------------------------------------------------------
    1      100.78     23.80       1.996     .58       79.20
    2       93.00     25.46       1.917     .58       44.70

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.
  SUMMARY RESULTS:
  STREAM   CONFLUENCE   EFFECTIVE
  NUMBER     Q(CFS)    AREA(ACRES)
-----------------------------------------------
    1      192.87       120.99
    2      188.14       123.90
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    192.87   TIME(MINUTES) =   23.803
  EFFECTIVE AREA(ACRES) =    120.99
  TOTAL AREA(ACRES) =    123.90


**************************************************************************
  FLOW PROCESS FROM NODE   118.10 TO NODE   113.10 IS CODE =   3
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  37.1 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =  17.4
  UPSTREAM NODE ELEVATION =  1350.00
  DOWNSTREAM NODE ELEVATION =  1303.00
  FLOWLENGTH(FEET) =  2650.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =  192.87
  TRAVEL TIME(MIN.) =   2.53    TC(MIN.) =  26.34


**************************************************************************
  FLOW PROCESS FROM NODE   113.10 TO NODE   113.10 IS CODE =   1
--------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MINUTES) =  26.34
  RAINFALL INTENSITY (INCH./HOUR) =   1.88
  EFFECTIVE STREAM AREA(ACRES) =  120.99
```

```
 TOTAL STREAM AREA(ACRES) =  123.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    192.87


****************************************************************************
 FLOW PROCESS FROM NODE   110.00 TO NODE   110.10 IS CODE =   2
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH =  1000.00
 UPSTREAM ELEVATION =   1356.00
 DOWNSTREAM ELEVATION =   1335.00
 ELEVATION DIFFERENCE =    21.00
 TC =  .412*[( 1000.00** 3.00)/(    21.00)]** .20 =   14.140
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.728
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA RUNOFF(CFS) =    14.49
 TOTAL AREA(ACRES) =     7.50   PEAK FLOW RATE(CFS) =    14.49


****************************************************************************
 FLOW PROCESS FROM NODE   110.10 TO NODE   110.20 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1335.00
 DOWNSTREAM NODE ELEVATION =   1319.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =    14.49
 FLOW VELOCITY(FEET/SEC) =   4.18   FLOW DEPTH(FEET) =    .77
 TRAVEL TIME(MIN.) =   3.99   TC(MIN.) =  18.13


****************************************************************************
 FLOW PROCESS FROM NODE   111.00 TO NODE   110.20 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.350
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =    7.50   SUBAREA RUNOFF(CFS) =   11.93
 EFFECTIVE AREA(ACRES) =   15.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   15.00
 PEAK FLOW RATE(CFS) =   23.87
 TC(MIN) =  18.13
```

```
**********************************************************************
 FLOW PROCESS FROM NODE   111.20 TO NODE   111.10 IS CODE =   5
----------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
======================================================================
 UPSTREAM NODE ELEVATION =   1319.00
 DOWNSTREAM NODE ELEVATION =   1309.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   650.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     23.87
 FLOW VELOCITY(FEET/SEC) =   4.67   FLOW DEPTH(FEET) =   1.02
 TRAVEL TIME(MIN.) =   2.32   TC(MIN.) =  20.45


**********************************************************************
 FLOW PROCESS FROM NODE   111.20 TO NODE   111.10 IS CODE =   8
----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.186
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =    5.30   SUBAREA RUNOFF(CFS) =    7.65
 EFFECTIVE AREA(ACRES) =   20.30
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   20.30
 PEAK FLOW RATE(CFS) =   29.31
 TC(MIN) =  20.45


**********************************************************************
 FLOW PROCESS FROM NODE   111.10 TO NODE   112.10 IS CODE =   3
----------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
======================================================================
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  19.5 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   8.7
 UPSTREAM NODE ELEVATION =  1309.00
 DOWNSTREAM NODE ELEVATION =  1306.00
 FLOWLENGTH(FEET) =   320.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    29.31
 TRAVEL TIME(MIN.) =    .62    TC(MIN.) =  21.07


**********************************************************************
 FLOW PROCESS FROM NODE   112.00 TO NODE   112.10 IS CODE =   8
----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.148
```

```
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   28.18
 EFFECTIVE AREA(ACRES) =   40.30
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   40.30
 PEAK FLOW RATE(CFS) =   56.79
 TC(MIN) =  21.07


****************************************************************************
 FLOW PROCESS FROM NODE   112.10 TO NODE   113.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.8 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   7.8
 UPSTREAM NODE ELEVATION =  1306.00
 DOWNSTREAM NODE ELEVATION =  1303.00
 FLOWLENGTH(FEET) =   650.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    56.79
 TRAVEL TIME(MIN.) =   1.39    TC(MIN.) =  22.46


****************************************************************************
 FLOW PROCESS FROM NODE   113.00 TO NODE   113.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.067
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   53.45
 EFFECTIVE AREA(ACRES) =   80.30
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   80.30
 PEAK FLOW RATE(CFS) =  107.30
 TC(MIN) =  22.46


****************************************************************************
 FLOW PROCESS FROM NODE   113.10 TO NODE   113.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MINUTES) =  22.46
 RAINFALL INTENSITY (INCH./HOUR) =   2.07
 EFFECTIVE STREAM AREA(ACRES) =   80.30
 TOTAL STREAM AREA(ACRES) =   80.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    107.30
```

```
  CONFLUENCE INFORMATION:
  STREAM    PEAK FLOW    TIME    INTENSITY     FM     EFFECTIVE
  NUMBER    RATE(CFS)   (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
-------------------------------------------------------------------
    1       192.87      26.34       1.878      .58       120.99
    2       107.30      22.46       2.067      .58        80.30

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.
  SUMMARY RESULTS:
  STREAM    CONFLUENCE    EFFECTIVE
  NUMBER      Q(CFS)     AREA(ACRES)
-----------------------------------------
    1       286.56        201.29
    2       295.67        183.47
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    295.67   TIME(MINUTES) =   22.459
  EFFECTIVE AREA(ACRES) =    183.47
  TOTAL AREA(ACRES) =    204.20


****************************************************************************
  FLOW PROCESS FROM NODE   113.10 TO NODE  1500.10 IS CODE =   3
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  DEPTH OF FLOW IN  57.0 INCH PIPE IS  46.1 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =  19.2
  UPSTREAM NODE ELEVATION =  1303.00
  DOWNSTREAM NODE ELEVATION =  1282.00
  FLOWLENGTH(FEET) =  1150.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    295.67
  TRAVEL TIME(MIN.) =   1.00    TC(MIN.) =  23.46


****************************************************************************
  FLOW PROCESS FROM NODE  1500.00 TO NODE  1500.10 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.014
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   51.54
  EFFECTIVE AREA(ACRES) =  223.47
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =  244.20
  PEAK FLOW RATE(CFS) =  295.67
  TC(MIN) =  23.46


****************************************************************************
  FLOW PROCESS FROM NODE  1500.10 TO NODE  1500.10 IS CODE =   1
```

```
------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
========================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  23.46
 RAINFALL INTENSITY (INCH./HOUR) =   2.01
 EFFECTIVE STREAM AREA(ACRES) =  223.47
 TOTAL STREAM AREA(ACRES) =  244.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    295.67


************************************************************************
 FLOW PROCESS FROM NODE  1500.10 TO NODE  1500.10 IS CODE =   7
------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
========================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  22.70   RAIN INTENSITY(INCH/HOUR) =  2.05
 EFFECTIVE AREA(ACRES) =    12.10
 TOTAL AREA(ACRES) =    12.10   PEAK FLOW RATE(CFS) =     21.84
 AVERAGED LOSS RATE, Fm(IN/HR) =   .582


************************************************************************
 FLOW PROCESS FROM NODE  1500.10 TO NODE  1500.10 IS CODE =   1
------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
========================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MINUTES) =  22.70
 RAINFALL INTENSITY (INCH./HOUR) =   2.05
 EFFECTIVE STREAM AREA(ACRES) =   12.10
 TOTAL STREAM AREA(ACRES) =   12.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     21.84

 CONFLUENCE INFORMATION:
 STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
 NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
------------------------------------------------------------------
   1      295.67     23.46       2.014     .58      223.47
   2       21.84     22.70       2.054     .58       12.10

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.
 SUMMARY RESULTS:
 STREAM   CONFLUENCE   EFFECTIVE
 NUMBER     Q(CFS)    AREA(ACRES)
-------------------------------------------
   1      316.92       235.57
   2      315.98       228.38
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    316.92   TIME(MINUTES) =   23.455
 EFFECTIVE AREA(ACRES) =    235.57
 TOTAL AREA(ACRES) =    256.30
```

```
****************************************************************************
 FLOW PROCESS FROM NODE  1500.10 TO NODE  1504.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  63.0 INCH PIPE IS  46.1 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  18.7
 UPSTREAM NODE ELEVATION =  1282.00
 DOWNSTREAM NODE ELEVATION =  1259.00
 FLOWLENGTH(FEET) =  1500.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   316.92
 TRAVEL TIME(MIN.) =   1.34    TC(MIN.) =  24.79

****************************************************************************
 FLOW PROCESS FROM NODE  1501.00 TO NODE  1504.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.948
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   46.00   SUBAREA RUNOFF(CFS) =   56.54
 EFFECTIVE AREA(ACRES) =  281.57
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  302.30
 PEAK FLOW RATE(CFS) =  346.08
 TC(MIN) =  24.79

****************************************************************************
 FLOW PROCESS FROM NODE  1504.10 TO NODE  1505.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  66.0 INCH PIPE IS  50.1 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  17.9
 UPSTREAM NODE ELEVATION =  1259.00
 DOWNSTREAM NODE ELEVATION =  1240.00
 FLOWLENGTH(FEET) =  1450.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   346.08
 TRAVEL TIME(MIN.) =   1.35    TC(MIN.) =  26.14

****************************************************************************
 FLOW PROCESS FROM NODE  1505.00 TO NODE  1505.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.887
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   46.97
 EFFECTIVE AREA(ACRES) =  321.57
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  342.30
 PEAK FLOW RATE(CFS) =  377.60
 TC(MIN) =  26.14


****************************************************************************
 FLOW PROCESS FROM NODE  1505.10 TO NODE  1505.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  26.14
 RAINFALL INTENSITY (INCH./HOUR) =   1.89
 EFFECTIVE STREAM AREA(ACRES) =  321.57
 TOTAL STREAM AREA(ACRES) =  342.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    377.60

 CONFLUENCE INFORMATION:
 STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
 NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
----------------------------------------------------------------
   1      377.60     26.14       1.887     .58      321.57

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  1 STREAMS.
 SUMMARY RESULTS:
 STREAM   CONFLUENCE   EFFECTIVE
 NUMBER     Q(CFS)    AREA(ACRES)
-------------------------------------------
   1      377.60       321.57
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    377.60   TIME(MINUTES) =   26.144
 EFFECTIVE AREA(ACRES) =    321.57
 TOTAL AREA(ACRES) =    342.30
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =    342.30
 EFFECTIVE AREA(ACRES) =    321.57
 PEAK FLOW RATE(CFS)   =    377.60
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        Copyright 1983,86,87 Advanced Engineering Software (aes)
           Ver. 4.1C  Release Date: 5/11/87  Serial # I00908

                        Especially prepared for:

                          HALL & FOREMAN
 ************************* DESCRIPTION OF STUDY *************************
* N.FONTANA MASTER S.D PLAN,W.FONTANA CHANNEL LATERAL 3                  *
* Q 25 YR, NOT FOR DESIGN Q                                              *
* VENKI.N, JN 3547, 5/16/89                                              *
 ************************************************************************

 FILE NAME: A:WFONLAT3.025
 TIME/DATE OF STUDY: 14:28    5/16/1989
========================================================================
 USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

 USER SPECIFIED STORM EVENT(YEAR) =    25.00
 SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
 SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =  .95
 *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
 10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =    .970
 100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
 COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =    25.00   1-HOUR INTENSITY(INCH/HOUR) = 1.1461
 SLOPE OF INTENSITY DURATION CURVE =  .6000


**************************************************************************
 FLOW PROCESS FROM NODE   115.00 TO NODE   115.01 IS CODE =   2
------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
 DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH =  1000.00
 UPSTREAM ELEVATION =   1408.00
 DOWNSTREAM ELEVATION =   1385.00
 ELEVATION DIFFERENCE =     23.00
 TC =  .412*[( 1000.00** 3.00)/(    23.00)]** .20 =   13.885
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.758
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA RUNOFF(CFS) =     13.90
 TOTAL AREA(ACRES) =      7.10   PEAK FLOW RATE(CFS) =     13.90


 **************************************************************************
 FLOW PROCESS FROM NODE   115.01 TO NODE   115.02 IS CODE =   5
------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
```

```
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     13.90
 FLOW VELOCITY(FEET/SEC) =   4.01   FLOW DEPTH(FEET) =     .77
 TRAVEL TIME(MIN.) =   4.16   TC(MIN.) =  18.04

****************************************************************************
 FLOW PROCESS FROM NODE   115.10 TO NODE   115.02 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.357
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =    7.10   SUBAREA RUNOFF(CFS) =   11.34
 EFFECTIVE AREA(ACRES) =   14.20
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   14.20
 PEAK FLOW RATE(CFS) =   22.68
 TC(MIN) =  18.04

****************************************************************************
 FLOW PROCESS FROM NODE   115.02 TO NODE   116.10 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1369.00
 DOWNSTREAM NODE ELEVATION =   1354.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   700.00
  HANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     22.68
 FLOW VELOCITY(FEET/SEC) =   5.33   FLOW DEPTH(FEET) =     .89
 TRAVEL TIME(MIN.) =   2.19   TC(MIN.) =  20.23

****************************************************************************
 FLOW PROCESS FROM NODE   116.00 TO NODE   116.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.200
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =    5.00   SUBAREA RUNOFF(CFS) =    7.28
 EFFECTIVE AREA(ACRES) =   19.20
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   19.20
 PEAK FLOW RATE(CFS) =   27.96
 TC(MIN) =  20.23

****************************************************************************
 FLOW PROCESS FROM NODE   116.10 TO NODE   117.10 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1354.00   DOWNSTREAM ELEVATION =   1352.00
 STREET LENGTH(FEET) =   320.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 20.00
```

```
 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   27.96
   STREETFLOW MODEL RESULTS:
      NOTE: STREETFLOW EXCEEDS TOP OF CURB.
      THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .67
      HALFSTREET FLOODWIDTH(FEET) =   19.63
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.01
      PRODUCT OF DEPTH&VELOCITY =    2.02
 STREETFLOW TRAVELTIME(MIN) =   1.77   TC(MIN) =  22.00

  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.092
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   19.20
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   19.20   PEAK FLOW RATE(CFS) =     27.96
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .67   HALFSTREET FLOODWIDTH(FEET) = 19.63
 FLOW VELOCITY(FEET/SEC.) =  3.01   DEPTH*VELOCITY =   2.02

****************************************************************************
 FLOW PROCESS FROM NODE   117.00 TO NODE   117.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 ============================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.092
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   19.00   SUBAREA RUNOFF(CFS) =   25.83
 EFFECTIVE AREA(ACRES) =   38.20
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   38.20
 PEAK FLOW RATE(CFS) =   51.92
 TC(MIN) =  22.00

****************************************************************************
 FLOW PROCESS FROM NODE   117.10 TO NODE   118.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  33.6 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   6.3
 UPSTREAM NODE ELEVATION =  1352.00
 DOWNSTREAM NODE ELEVATION =  1350.00
 FLOWLENGTH(FEET) =   680.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =     51.92
  RAVEL TIME(MIN.) =   1.80    TC(MIN.) =  23.80

****************************************************************************
 FLOW PROCESS FROM NODE   118.00 TO NODE   118.10 IS CODE =   8
----------------------------------------------------------------------------
```

```
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   41.00   SUBAREA RUNOFF(CFS) =   52.17
 EFFECTIVE AREA(ACRES) =   79.20
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   79.20
  EAK FLOW RATE(CFS) =  100.78
 TC(MIN) =  23.80

****************************************************************************
 FLOW PROCESS FROM NODE   118.10 TO NODE   113.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  30.1 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  14.7
 UPSTREAM NODE ELEVATION =  1350.00
 DOWNSTREAM NODE ELEVATION =  1303.00
 FLOWLENGTH(FEET) =  2650.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   100.78
 TRAVEL TIME(MIN.) =   3.01    TC(MIN.) =  26.81

****************************************************************************
 FLOW PROCESS FROM NODE   113.10 TO NODE   113.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  IME OF CONCENTRATION(MINUTES) =  26.81
 RAINFALL INTENSITY (INCH./HOUR) =   1.86
 EFFECTIVE STREAM AREA(ACRES) =   79.20
 TOTAL STREAM AREA(ACRES) =   79.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    100.78

****************************************************************************
 FLOW PROCESS FROM NODE   110.00 TO NODE   110.10 IS CODE =   2
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH =  1000.00
 UPSTREAM ELEVATION =   1356.00
 DOWNSTREAM ELEVATION =   1335.00
 ELEVATION DIFFERENCE =     21.00
 TC =  .412*[( 1000.00** 3.00)/(    21.00)]** .20 =   14.140
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.728
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA RUNOFF(CFS) =     14.49
 TOTAL AREA(ACRES) =      7.50   PEAK FLOW RATE(CFS) =     14.49

****************************************************************************
 FLOW PROCESS FROM NODE   110.10 TO NODE   110.20 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
```

```
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     14.49
 FLOW VELOCITY(FEET/SEC) =   4.18   FLOW DEPTH(FEET) =     .77
  RAVEL TIME(MIN.) =   3.99   TC(MIN.) =  18.13

****************************************************************************
 FLOW PROCESS FROM NODE   111.00 TO NODE   110.20 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.350
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =    7.50   SUBAREA RUNOFF(CFS) =   11.93
 EFFECTIVE AREA(ACRES) =   15.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   15.00
 PEAK FLOW RATE(CFS) =   23.87
 TC(MIN) =  18.13

****************************************************************************
 FLOW PROCESS FROM NODE   110.20 TO NODE   111.10 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1319.00
  OWNSTREAM NODE ELEVATION =   1309.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   650.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     23.87
 FLOW VELOCITY(FEET/SEC) =   4.67   FLOW DEPTH(FEET) =   1.02
 TRAVEL TIME(MIN.) =   2.32   TC(MIN.) =  20.45

****************************************************************************
 FLOW PROCESS FROM NODE   111.20 TO NODE   111.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.186
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =    5.30   SUBAREA RUNOFF(CFS) =    7.65
 EFFECTIVE AREA(ACRES) =   20.30
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   20.30
 PEAK FLOW RATE(CFS) =   29.31
 TC(MIN) =  20.45

****************************************************************************
 FLOW PROCESS FROM NODE   111.10 TO NODE   112.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
 FLOWLENGTH(FEET) =   320.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =     29.31
 TRAVEL TIME(MIN.) =    .62   TC(MIN.) =  21.07

****************************************************************************
 FLOW PROCESS FROM NODE   112.00 TO NODE   112.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.148
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   28.18
 EFFECTIVE AREA(ACRES) =   40.30
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   40.30
 PEAK FLOW RATE(CFS) =   56.79
 TC(MIN) =  21.07

****************************************************************************
 FLOW PROCESS FROM NODE   112.10 TO NODE   113.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.8 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   7.8
 UPSTREAM NODE ELEVATION =  1306.00
  OWNSTREAM NODE ELEVATION =  1303.00
 FLOWLENGTH(FEET) =   650.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =     56.79
 TRAVEL TIME(MIN.) =   1.39    TC(MIN.) =  22.46

****************************************************************************
 FLOW PROCESS FROM NODE   113.00 TO NODE   113.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.067
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   53.45
 EFFECTIVE AREA(ACRES) =   80.30
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   80.30
 PEAK FLOW RATE(CFS) =  107.30
 TC(MIN) =  22.46

****************************************************************************
 FLOW PROCESS FROM NODE   113.10 TO NODE   113.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MINUTES) =  22.46
```

```
 CONFLUENCE INFORMATION:
 STREAM    PEAK FLOW    TIME    INTENSITY     FM     EFFECTIVE
 NUMBER    RATE(CFS)   (MIN.)  (INCH/HOUR)  (IN/HR) AREA(ACRES)
 ------------------------------------------------------------------
   1        100.78      26.81       1.858      .58        79.20
   2        107.30      22.46       2.067      .58        80.30

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.
 SUMMARY RESULTS:
 STREAM    CONFLUENCE    EFFECTIVE
 NUMBER      Q(CFS)     AREA(ACRES)
 ------------------------------------------
   1        193.03        159.50
   2        205.51        146.65
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    205.51   TIME(MINUTES) =   22.459
 EFFECTIVE AREA(ACRES) =    146.65
 TOTAL AREA(ACRES) =    159.50

****************************************************************************
 FLOW PROCESS FROM NODE   113.10 TO NODE  1500.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  51.0 INCH PIPE IS  38.7 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  17.8
 UPSTREAM NODE ELEVATION =  1303.00
 DOWNSTREAM NODE ELEVATION =  1282.00
 FLOWLENGTH(FEET) =  1150.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    205.51
 TRAVEL TIME(MIN.) =   1.08    TC(MIN.) =  23.54

****************************************************************************
 FLOW PROCESS FROM NODE  1500.00 TO NODE  1500.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.009
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   51.39
 EFFECTIVE AREA(ACRES) =  186.65
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  199.50
 PEAK FLOW RATE(CFS) =  239.79
 TC(MIN) =  23.54

Q100 = 73.88 . Q100-21 = 22.5 CFS  used 21.946
(Tc) = 22.70  (used 24.7)
D100 - adj Area = 12.1 AC  = 0.50

****************************************************************************
 FLOW PROCESS FROM NODE  1500.10 TO NODE  1504.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  41.3 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  17.4
```

```
 PIPEFLOW THRU SUBAREA(CFS) =    239.79
 TRAVEL TIME(MIN.) =   1.43    TC(MIN.) =  24.97

****************************************************************************
 LOW PROCESS FROM NODE  1501.00 TO NODE  1504.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.939
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   46.00   SUBAREA RUNOFF(CFS) =   56.20
 EFFECTIVE AREA(ACRES) =  232.65
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  245.50
 PEAK FLOW RATE(CFS) =  284.22
 TC(MIN) =  24.97

****************************************************************************
 FLOW PROCESS FROM NODE  1504.10 TO NODE  1505.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  48.0 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  16.9
 UPSTREAM NODE ELEVATION =  1259.00
 DOWNSTREAM NODE ELEVATION =  1240.00
 FLOWLENGTH(FEET) =  1450.00   MANNINGS N =  .013
  STIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    284.22
 TRAVEL TIME(MIN.) =   1.43    TC(MIN.) =  26.40

****************************************************************************
 FLOW PROCESS FROM NODE  1505.00 TO NODE  1505.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.876
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   46.57
 EFFECTIVE AREA(ACRES) =  272.65
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  285.50
 PEAK FLOW RATE(CFS) =  317.42
 TC(MIN) =  26.40

****************************************************************************
 FLOW PROCESS FROM NODE  1505.10 TO NODE  1505.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  26.40
 RAINFALL INTENSITY (INCH./HOUR) =   1.88
 EFFECTIVE STREAM AREA(ACRES) =  272.65
```

STREAM NUMBER	PEAK FLOW RATE(CFS)	TIME (MIN.)	INTENSITY (INCH/HOUR)	FM (IN/HR)	EFFECTIVE AREA(ACRES)
1	317.42	26.40	1.876	.58	272.65

AINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 1 STREAMS.
SUMMARY RESULTS:

STREAM NUMBER	CONFLUENCE Q(CFS)	EFFECTIVE AREA(ACRES)
1	317.42	272.65

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 317.42 TIME(MINUTES) = 26.403
EFFECTIVE AREA(ACRES) = 272.65
TOTAL AREA(ACRES) = 285.50

==========

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 285.50
EFFECTIVE AREA(ACRES) = 272.65
PEAK FLOW RATE(CFS) = 317.42

==========

END OF RATIONAL METHOD ANALYSIS

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        Copyright 1983,86,87 Advanced Engineering Software (aes)
          Ver. 4.1C  Release Date: 5/11/87  Serial # I00908

                        Especially prepared for:

                          HALL & FOREMAN
 ************************* DESCRIPTION OF STUDY *************************
 N.FONTANA MASTER S.D PLAN, W.FONTANA CHANNEL LATERAL 3                  *
 Q 100 YR, NOT FOR DESIGN                                               *
 VENKI.N,JN 3547, 5/16/89                                               *
 **************************************************************************

 FILE NAME: A:WFONLAT3.100
 TIME/DATE OF STUDY: 14:29   5/16/1989
==========================================================================
 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 =  .95
 *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
 10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =   .970
 100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
 COMPUTED RAINFALL INTENSITY DATA:
 STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) = 1.4700
 SLOPE OF INTENSITY DURATION CURVE =  .6000


**************************************************************************
 FLOW PROCESS FROM NODE   115.00 TO NODE   115.01 IS CODE =   2
--------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
 DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH =  1000.00
 UPSTREAM ELEVATION =   1408.00
 DOWNSTREAM ELEVATION =   1385.00
 ELEVATION DIFFERENCE =     23.00
 TC =  .412*[( 1000.00** 3.00)/(    23.00)]** .20 =   13.885
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.537
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA RUNOFF(CFS) =     18.88
 TOTAL AREA(ACRES) =      7.10   PEAK FLOW RATE(CFS) =     18.88

  **************************************************************************
 FLOW PROCESS FROM NODE   115.01 TO NODE   115.02 IS CODE =   5
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
```

```
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     18.88
 FLOW VELOCITY(FEET/SEC) =   4.43   FLOW DEPTH(FEET) =    .89
 TRAVEL TIME(MIN.) =   3.76   TC(MIN.) =  17.64

****************************************************************************
 FLOW PROCESS FROM NODE   115.10 TO NODE   115.02 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.064
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =    7.10   SUBAREA RUNOFF(CFS) =   15.86
 EFFECTIVE AREA(ACRES) =   14.20
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   14.20
 PEAK FLOW RATE(CFS) =   31.72
 TC(MIN) =  17.64

****************************************************************************
 FLOW PROCESS FROM NODE   115.02 TO NODE   116.10 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1369.00
 DOWNSTREAM NODE ELEVATION =   1354.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   700.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     31.72
 FLOW VELOCITY(FEET/SEC) =   5.71   FLOW DEPTH(FEET) =   1.08
 TRAVEL TIME(MIN.) =   2.04   TC(MIN.) =  19.69

****************************************************************************
 FLOW PROCESS FROM NODE   116.00 TO NODE   116.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.869
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =    5.00   SUBAREA RUNOFF(CFS) =   10.29
 EFFECTIVE AREA(ACRES) =   19.20
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   19.20
 PEAK FLOW RATE(CFS) =   39.51
 TC(MIN) =  19.69

****************************************************************************
 FLOW PROCESS FROM NODE   116.10 TO NODE   117.10 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1354.00   DOWNSTREAM ELEVATION =   1352.00
 STREET LENGTH(FEET) =   320.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 20.00
```

```
 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   39.51
***STREET FLOWING FULL***
 STREETFLOW MODEL RESULTS:
      NOTE: STREETFLOW EXCEEDS TOP OF CURB.
      THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .73
      HALFSTREET FLOODWIDTH(FEET) =   20.00
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.43
      PRODUCT OF DEPTH&VELOCITY =    2.49
STREETFLOW TRAVELTIME(MIN) =   1.56   TC(MIN) =  21.24

 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.741
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
EFFECTIVE AREA(ACRES) =   19.20
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =   19.20   PEAK FLOW RATE(CFS) =     39.51
END OF SUBAREA STREETFLOW HYDRAULICS:
DEPTH(FEET) =  .73   HALFSTREET FLOODWIDTH(FEET) = 20.00
FLOW VELOCITY(FEET/SEC.) =  3.43   DEPTH*VELOCITY =   2.49


****************************************************************************
FLOW PROCESS FROM NODE   117.00 TO NODE   117.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.741
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
SUBAREA AREA(ACRES) =   19.00   SUBAREA RUNOFF(CFS) =   36.91
EFFECTIVE AREA(ACRES) =   38.20
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =   38.20
PEAK FLOW RATE(CFS) =   74.22
TC(MIN) =  21.24


****************************************************************************
FLOW PROCESS FROM NODE   117.10 TO NODE   118.10 IS CODE =   3
----------------------------------------------------------------------------
>>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
DEPTH OF FLOW IN  48.0 INCH PIPE IS  38.4 INCHES
PIPEFLOW VELOCITY(FEET/SEC.) =   6.9
UPSTREAM NODE ELEVATION =  1352.00
DOWNSTREAM NODE ELEVATION =  1350.00
FLOWLENGTH(FEET) =   680.00   MANNINGS N =  .013
ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 IPEFLOW THRU SUBAREA(CFS) =     74.22
TRAVEL TIME(MIN.) =   1.65    TC(MIN.) =  22.89


****************************************************************************
FLOW PROCESS FROM NODE   118.00 TO NODE   118.10 IS CODE =   8
```

```
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   41.00   SUBAREA RUNOFF(CFS) =   75.23
 EFFECTIVE AREA(ACRES) =   79.20
 AVERAGED Fm(INCH/HR) =   .582
  OTAL AREA(ACRES) =   79.20
 PEAK FLOW RATE(CFS) =  145.32
 TC(MIN) =  22.89

****************************************************************************
 FLOW PROCESS FROM NODE   118.10 TO NODE   113.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  45.0 INCH PIPE IS  34.2 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  16.1
 UPSTREAM NODE ELEVATION =  1350.00
 DOWNSTREAM NODE ELEVATION =  1303.00
 FLOWLENGTH(FEET) =  2650.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   145.32
 TRAVEL TIME(MIN.) =   2.74    TC(MIN.) =  25.63

****************************************************************************
 FLOW PROCESS FROM NODE   113.10 TO NODE   113.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  ONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  25.63
 RAINFALL INTENSITY (INCH./HOUR) =   2.45
 EFFECTIVE STREAM AREA(ACRES) =   79.20
 TOTAL STREAM AREA(ACRES) =   79.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    145.32

****************************************************************************
 FLOW PROCESS FROM NODE   110.00 TO NODE   110.10 IS CODE =   2
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH =  1000.00
 UPSTREAM ELEVATION =   1356.00
 DOWNSTREAM ELEVATION =   1335.00
 ELEVATION DIFFERENCE =    21.00
 TC =  .412*[( 1000.00** 3.00)/(    21.00)]** .20 =   14.140
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.499
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA RUNOFF(CFS) =    19.69
  OTAL AREA(ACRES) =     7.50   PEAK FLOW RATE(CFS) =    19.69

****************************************************************************
 FLOW PROCESS FROM NODE   110.10 TO NODE   110.20 IS CODE =   5
----------------------------------------------------------------------------
```

```
 DOWNSTREAM NODE ELEVATION =   1319.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     19.69
  LOW VELOCITY(FEET/SEC) =   4.62   FLOW DEPTH(FEET) =    .89
 TRAVEL TIME(MIN.) =   3.60   TC(MIN.) =  17.74

****************************************************************************
 FLOW PROCESS FROM NODE   111.00 TO NODE   110.20 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.053
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =    7.50   SUBAREA RUNOFF(CFS) =   16.68
 EFFECTIVE AREA(ACRES) =   15.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   15.00
 PEAK FLOW RATE(CFS) =   33.36
 TC(MIN) =  17.74

****************************************************************************
 FLOW PROCESS FROM NODE   110.20 TO NODE   111.10 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  PSTREAM NODE ELEVATION =   1319.00
 DOWNSTREAM NODE ELEVATION =   1309.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   650.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     33.36
 FLOW VELOCITY(FEET/SEC) =   5.13   FLOW DEPTH(FEET) =   1.20
 TRAVEL TIME(MIN.) =   2.11   TC(MIN.) =  19.86

****************************************************************************
 FLOW PROCESS FROM NODE   111.20 TO NODE   111.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.854
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =    5.30   SUBAREA RUNOFF(CFS) =   10.84
 EFFECTIVE AREA(ACRES) =   20.30
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   20.30
 PEAK FLOW RATE(CFS) =   41.51
 TC(MIN) =  19.86

****************************************************************************
 FLOW PROCESS FROM NODE   111.10 TO NODE   112.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
 DOWNSTREAM NODE ELEVATION =  1306.00
 FLOWLENGTH(FEET) =   320.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =     41.51
 TRAVEL TIME(MIN.) =    .57    TC(MIN.) =  20.42

****************************************************************************
 FLOW PROCESS FROM NODE   112.00 TO NODE   112.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.806
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   40.04
 EFFECTIVE AREA(ACRES) =   40.30
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   40.30
 PEAK FLOW RATE(CFS) =   80.67
 TC(MIN) =  20.42

****************************************************************************
 FLOW PROCESS FROM NODE   112.10 TO NODE   113.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  33.9 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   8.5
  PSTREAM NODE ELEVATION =  1306.00
 DOWNSTREAM NODE ELEVATION =  1303.00
 FLOWLENGTH(FEET) =   650.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =     80.67
 TRAVEL TIME(MIN.) =   1.28    TC(MIN.) =  21.70

****************************************************************************
 FLOW PROCESS FROM NODE   113.00 TO NODE   113.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.706
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   76.47
 EFFECTIVE AREA(ACRES) =   80.30
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   80.30
 PEAK FLOW RATE(CFS) =  153.51
 TC(MIN) =  21.70

****************************************************************************
 FLOW PROCESS FROM NODE   113.10 TO NODE   113.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
```

```
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    153.51

 CONFLUENCE INFORMATION:
 STREAM    PEAK FLOW    TIME    INTENSITY     FM     EFFECTIVE
 NUMBER    RATE(CFS)   (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
 ---------------------------------------------------------------
   1       145.32      25.63       2.449      .58       79.20
   2       153.51      21.70       2.706      .58       80.30

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.
 SUMMARY RESULTS:
 STREAM    CONFLUENCE    EFFECTIVE
 NUMBER      Q(CFS)     AREA(ACRES)
-------------------------------------------
   1       280.24        159.50
   2       293.49        147.36
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    293.49   TIME(MINUTES) =   21.700
 EFFECTIVE AREA(ACRES) =    147.36
 TOTAL AREA(ACRES) =    159.50


****************************************************************************
 FLOW PROCESS FROM NODE   113.10 TO NODE  1500.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  45.8 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  19.2
  PSTREAM NODE ELEVATION =  1303.00
 DOWNSTREAM NODE ELEVATION =  1282.00
 FLOWLENGTH(FEET) =  1150.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    293.49
 TRAVEL TIME(MIN.) =   1.00    TC(MIN.) =  22.70


****************************************************************************
 FLOW PROCESS FROM NODE  1500.00 TO NODE  1500.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.634
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   73.88
 EFFECTIVE AREA(ACRES) =  187.36
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  199.50
 PEAK FLOW RATE(CFS) =  346.05
 TC(MIN) =  22.70


****************************************************************************
  LOW PROCESS FROM NODE  1500.10 TO NODE  1504.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  63.0 INCH PIPE IS  49.8 INCHES
```

```
 ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    346.05
 TRAVEL TIME(MIN.) =   1.33    TC(MIN.) =  24.02

 ****************************************************************************
 FLOW PROCESS FROM NODE  1501.00 TO NODE  1504.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.546
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   46.00   SUBAREA RUNOFF(CFS) =   81.30
 EFFECTIVE AREA(ACRES) =  233.36
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  245.50
 PEAK FLOW RATE(CFS) =  412.46
 TC(MIN) =  24.02

****************************************************************************
 FLOW PROCESS FROM NODE  1504.10 TO NODE  1505.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  69.0 INCH PIPE IS  55.2 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  18.5
 UPSTREAM NODE ELEVATION =  1259.00
 DOWNSTREAM NODE ELEVATION =  1240.00
  LOWLENGTH(FEET) =  1450.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    412.46
 TRAVEL TIME(MIN.) =   1.31    TC(MIN.) =  25.33

****************************************************************************
 FLOW PROCESS FROM NODE  1505.00 TO NODE  1505.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.466
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   67.84
 EFFECTIVE AREA(ACRES) =  273.36
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  285.50
 PEAK FLOW RATE(CFS) =  463.59
 TC(MIN) =  25.33

****************************************************************************
 FLOW PROCESS FROM NODE  1505.10 TO NODE  1505.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  25.33
 RAINFALL INTENSITY (INCH./HOUR) =   2.47
```

CONFLUENCE INFORMATION:

STREAM NUMBER	PEAK FLOW RATE(CFS)	TIME (MIN.)	INTENSITY (INCH/HOUR)	FM (IN/HR)	EFFECTIVE AREA(ACRES)
1	463.59	25.33	2.466	.58	273.36

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 1 STREAMS.
SUMMARY RESULTS:

STREAM NUMBER	CONFLUENCE Q(CFS)	EFFECTIVE AREA(ACRES)
1	463.59	273.36

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 463.59 TIME(MINUTES) = 25.328
EFFECTIVE AREA(ACRES) = 273.36
TOTAL AREA(ACRES) = 285.50

==========

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 285.50
EFFECTIVE AREA(ACRES) = 273.36
PEAK FLOW RATE(CFS) = 463.59

==========

END OF RATIONAL METHOD ANALYSIS

RATIONAL METHOD USING AESSOFT

PROJECT: T3 — 25 - DATA COUNTY

STORM FREQUENCY: 25YR-100YR JOB NO. _____

SUBAREA DESIGNATION	NODAL REACH	FLOW CODE	UPPER-LOWER ELEVATIONS	TRAVEL LENGTH	LAND USE	SOIL GROUP	AREA	NOTES AND/OR DATA
115.0	115-01	2	1408 / 1385	1000	3.4	A	7.1	
115.01	115.02	5	1385 / 1369	1000		A	-	
115.10	115.02	8					7.1	
115.02	116.1	5	1369 / 1354	700				
116.0	116.1	8					5.0	
116.1	117.1	6	1354 / 1352	320				
117.0	117.1	8					19	
117.1	118.1	3	1352 / 1350	680				
118.0	118.1	8					~~40~~ 41	
118.1	118.1	1						142
213.1	213.1	7						Q100-25 = 89.8CFS, Prorated Area = 44.1 Ac Tc = 22.44, Fm = 0.582 ~~CLF 1350'~~ Backing of SLENDER
213.1	118.1	6	1403 / 135~	276°				
118.1	118.1	1						292
118.1	113.1	3	1350 / 1303	2650				
113.1	113.1	1						15 —
110	110.10	2	1356 / 1335	1000			7.5	
110.10	110.20	5	1335 / 1319	~~1000~~				
111 -	110.2-	8					2.5	

RATIONAL METHOD USING AESSOFT

___ OF ___

PROJECT: _____ _____ COUNTY

_____

STORM FREQUENCY: _____ JOB NO. _____

SUB-AREA DESIGNATION	NODAL REACH	FLOW CODE	UPPER-LOWER ELEVATIONS	TRAVEL LENGTH	LAND USE	SOIL GROUP	AREA	NOTES AND/OR DATA
111.2	111.1	8					~~10~~ 5.3	
111.1	112.1	3	1309 / 1306	320				
112	112.1	8					20Ac	
112.1	113.1	3	1306 / 1303	650				
113.0	113.1	8					40	
113.1	113.1	1						2.—
113.1	1500.1	3	1303 / 1282	1150				
1500	1500.1	8					40Ac	
1500.1	1500.1	1						10_{0-2}
1500.1	1500.1	7						Q = 21.84 cfs; $Q_{100-2yr}$ Diff. A = 12.1 Ac. $(T_c)_{100}$ = 24.7 m, Fm = 0.55 Q = 25 yr. calc.
1500.1	1500.1	1						24.2
1500.1	1504.1	3	1282 / 1259	1500				
1501	1504.1	8					46Ac	
1504.1	1505.1	3	1259 / 1240	1450				
1505	1505.1	8					4.0Ac	
1505.1	1505.1	1						

by 2 yr Q

```
**********************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        Copyright 1983,86,87 Advanced Engineering Software (aes)
           Ver. 4.1C  Release Date: 5/11/87  Serial # I00908

                        Especially prepared for:

                           HALL & FOREMAN
 ************************* DESCRIPTION OF STUDY ***********************
* N. FONTANA MASTER S.D. PLAN, W. FONTANA CHANNEL LAT. 4, ALONG CITRUS
* Q 100-25 YEAR, DESIGN Q, INCLUDES OVERFLOW FROM BASELINE
* JN 3547
 **********************************************************************

  FILE NAME: WFONT4R.DES
  TIME/DATE OF STUDY:  0:10   1/ 1/1980
======================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
======================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =   .970
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   25.00   1-HOUR INTENSITY(INCH/HOUR) = 1.1461
  SLOPE OF INTENSITY DURATION CURVE =  .6000


**********************************************************************
  FLOW PROCESS FROM NODE   119.00 TO NODE   119.01 IS CODE =   2
----------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
======================================================================
  DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

  TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
  INITIAL SUBAREA FLOW-LENGTH =  1000.00
  UPSTREAM ELEVATION =   1403.00
  DOWNSTREAM ELEVATION =   1382.00
  ELEVATION DIFFERENCE =     21.00
  TC =  .412*[( 1000.00** 3.00)/(    21.00)]** .20 =   14.140
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.728
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA RUNOFF(CFS) =     14.49
  TOTAL AREA(ACRES) =      7.50   PEAK FLOW RATE(CFS) =     14.49
```

```
**********************************************************************
 FLOW PROCESS FROM NODE   119.01 TO NODE   119.02 IS CODE =   5
----------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
======================================================================
 UPSTREAM NODE ELEVATION =   1382.00
 DOWNSTREAM NODE ELEVATION =   1363.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     14.49
 FLOW VELOCITY(FEET/SEC) =   4.41   FLOW DEPTH(FEET) =    .73
 TRAVEL TIME(MIN.) =   3.78   TC(MIN.) =  17.92


**********************************************************************
 FLOW PROCESS FROM NODE   119.10 TO NODE   119.02 IS CODE =   8
----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.367
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =    7.50   SUBAREA RUNOFF(CFS) =   12.05
 EFFECTIVE AREA(ACRES) =   15.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   15.00
 PEAK FLOW RATE(CFS) =   24.10
 TC(MIN) =  17.92


**********************************************************************
 FLOW PROCESS FROM NODE   119.02 TO NODE   119.12 IS CODE =   5
----------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
======================================================================
 UPSTREAM NODE ELEVATION =   1363.00
 DOWNSTREAM NODE ELEVATION =   1348.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =   750.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     24.10
 FLOW VELOCITY(FEET/SEC) =   5.15   FLOW DEPTH(FEET) =    .95
 TRAVEL TIME(MIN.) =   2.43   TC(MIN.) =  20.34


**********************************************************************
 FLOW PROCESS FROM NODE   119.20 TO NODE   119.12 IS CODE =   8
----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.193
 SOIL CLASSIFICATION IS "A"
```

```
 RESIDENTIAL-> 5-7 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .4
 SUBAREA AREA(ACRES) =    5.30   SUBAREA RUNOFF(CFS) =    8.15
 EFFECTIVE AREA(ACRES) =   20.30
 AVERAGED Fm(INCH/HR) =   .557
 TOTAL AREA(ACRES) =   20.30
 PEAK FLOW RATE(CFS) =   29.90
 TC(MIN) =  20.34


****************************************************************************
 FLOW PROCESS FROM NODE   119.12 TO NODE   119.22 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1348.50   DOWNSTREAM ELEVATION =   1346.80
 STREET LENGTH(FEET) =   400.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

       **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   29.90
 ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS:
       NOTE: STREETFLOW EXCEEDS TOP OF CURB.
       THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .71
       HALFSTREET FLOODWIDTH(FEET) =   20.00
       AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.78
       PRODUCT OF DEPTH&VELOCITY =    1.97
 STREETFLOW TRAVELTIME(MIN) =   2.40   TC(MIN) =  22.74

   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.051
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   20.30
 AVERAGED Fm(INCH/HR) =   .557
 TOTAL AREA(ACRES) =   20.30   PEAK FLOW RATE(CFS) =     29.90
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .71   HALFSTREET FLOODWIDTH(FEET) = 20.00
 FLOW VELOCITY(FEET/SEC.) =  2.78   DEPTH*VELOCITY =   1.97


****************************************************************************
 FLOW PROCESS FROM NODE   119.21 TO NODE   119.22 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.051
```

```
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   26.45
 EFFECTIVE AREA(ACRES) =   40.30
 AVERAGED Fm(INCH/HR) =   .569
 TOTAL AREA(ACRES) =   40.30
 PEAK FLOW RATE(CFS) =   53.76
 TC(MIN) =  22.74


****************************************************************************
 FLOW PROCESS FROM NODE   119.22 TO NODE   119.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  30.2 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   7.3
 UPSTREAM NODE ELEVATION =  1346.80
 DOWNSTREAM NODE ELEVATION =  1344.00
 FLOWLENGTH(FEET) =   700.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    53.76
 TRAVEL TIME(MIN.) =   1.61    TC(MIN.) =  24.35


****************************************************************************
 FLOW PROCESS FROM NODE   119.31 TO NODE   119.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.969
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   49.93
 EFFECTIVE AREA(ACRES) =   80.30
 AVERAGED Fm(INCH/HR) =   .576
 TOTAL AREA(ACRES) =   80.30
 PEAK FLOW RATE(CFS) =  100.71
 TC(MIN) =  24.35


****************************************************************************
 FLOW PROCESS FROM NODE   119.10 TO NODE   119.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  24.35
 RAINFALL INTENSITY (INCH./HOUR) =   1.97
 EFFECTIVE STREAM AREA(ACRES) =   80.30
 TOTAL STREAM AREA(ACRES) =   80.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    100.71
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   214.10 TO NODE   214.10 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  18.60   RAIN INTENSITY(INCH/HOUR) =  2.31
  EFFECTIVE AREA(ACRES) =    48.30
  TOTAL AREA(ACRES) =    48.30   PEAK FLOW RATE(CFS) =     95.70
  AVERAGED LOSS RATE, Fm(IN/HR) =   .582


****************************************************************************
  FLOW PROCESS FROM NODE   214.10 TO NODE   119.10 IS CODE =   6
----------------------------------------------------------------------------
  >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM ELEVATION =   1395.00   DOWNSTREAM ELEVATION =   1344.00
  STREET LENGTH(FEET) =  2800.00   CURB HEIGTH(INCHES) = 8.
  STREET HALFWIDTH(FEET) = 32.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  24.00
  INTERIOR STREET CROSSFALL(DECIMAL) =   .020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

       **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   95.70
    STREETFLOW MODEL RESULTS:
       NOTE: STREETFLOW EXCEEDS TOP OF CURB.
       THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .82
       HALFSTREET FLOODWIDTH(FEET) =   27.12
       AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.87
       PRODUCT OF DEPTH&VELOCITY =    4.82
  STREETFLOW TRAVELTIME(MIN) =   7.95   TC(MIN) =  26.55

    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.869
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
  EFFECTIVE AREA(ACRES) =   48.30
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =   48.30   PEAK FLOW RATE(CFS) =     95.70
  END OF SUBAREA STREETFLOW HYDRAULICS:
  DEPTH(FEET) =  .82   HALFSTREET FLOODWIDTH(FEET) = 27.12
  FLOW VELOCITY(FEET/SEC.) =  5.87   DEPTH*VELOCITY =   4.82


****************************************************************************
  FLOW PROCESS FROM NODE   119.10 TO NODE   119.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MINUTES) =  26.55
  RAINFALL INTENSITY (INCH./HOUR) =   1.87
  EFFECTIVE STREAM AREA(ACRES) =   48.30
  TOTAL STREAM AREA(ACRES) =   48.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     95.70

  CONFLUENCE INFORMATION:
  STREAM    PEAK FLOW    TIME    INTENSITY     FM     EFFECTIVE
  NUMBER    RATE(CFS)   (MIN.) (INCH/HOUR)  (IN/HR) AREA(ACRES)
--------------------------------------------------------------------
    1       100.71      24.35       1.969      .58        80.30
    2        95.70      26.55       1.869      .58        48.30

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.
  SUMMARY RESULTS:
  STREAM    CONFLUENCE    EFFECTIVE
  NUMBER      Q(CFS)     AREA(ACRES)
-----------------------------------------------
    1       195.26        124.60
    2       189.21        128.60
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    195.26   TIME(MINUTES) =   24.347
  EFFECTIVE AREA(ACRES) =    124.60
  TOTAL AREA(ACRES) =    128.60


****************************************************************************
  FLOW PROCESS FROM NODE   119.10 TO NODE   114.10 IS CODE =   3
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  37.5 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =  17.5
  UPSTREAM NODE ELEVATION =  1344.00
  DOWNSTREAM NODE ELEVATION =  1297.00
  FLOWLENGTH(FEET) =  2650.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    195.26
  TRAVEL TIME(MIN.) =   2.53    TC(MIN.) =  26.88


****************************************************************************
  FLOW PROCESS FROM NODE   114.10 TO NODE   114.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MINUTES) =  26.88
  RAINFALL INTENSITY (INCH./HOUR) =   1.86
  EFFECTIVE STREAM AREA(ACRES) =  124.60
```

```
 TOTAL STREAM AREA(ACRES) =  128.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    195.26


****************************************************************************
 FLOW PROCESS FROM NODE   114.00 TO NODE   114.01 IS CODE =   2
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH =  1000.00
 UPSTREAM ELEVATION =   1350.00
 DOWNSTREAM ELEVATION =   1330.00
 ELEVATION DIFFERENCE =     20.00
 TC =  .412*[( 1000.00** 3.00)/(    20.00)]** .20 =   14.279
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.712
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA RUNOFF(CFS) =     14.38
 TOTAL AREA(ACRES) =      7.50   PEAK FLOW RATE(CFS) =     14.38


****************************************************************************
 FLOW PROCESS FROM NODE   114.01 TO NODE   114.02 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1330.00
 DOWNSTREAM NODE ELEVATION =   1313.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     14.38
 FLOW VELOCITY(FEET/SEC) =   4.14   FLOW DEPTH(FEET) =    .77
 TRAVEL TIME(MIN.) =   4.02   TC(MIN.) =  18.30


****************************************************************************
 FLOW PROCESS FROM NODE   114.20 TO NODE   114.02 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.337
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =    7.50   SUBAREA RUNOFF(CFS) =   11.85
 EFFECTIVE AREA(ACRES) =   15.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   15.00
 PEAK FLOW RATE(CFS) =   23.69
 TC(MIN) =  18.30
```

```
**************************************************************************
 FLOW PROCESS FROM NODE   114.02 TO NODE   114.12 IS CODE =   5
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
 UPSTREAM NODE ELEVATION =   1313.00
 DOWNSTREAM NODE ELEVATION =   1301.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =   680.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =    23.69
 FLOW VELOCITY(FEET/SEC) =   4.84   FLOW DEPTH(FEET) =    .98
 TRAVEL TIME(MIN.) =   2.34   TC(MIN.) =  20.64


**************************************************************************
 FLOW PROCESS FROM NODE   114.30 TO NODE   114.12 IS CODE =   8
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.174
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =    5.30   SUBAREA RUNOFF(CFS) =    7.59
 EFFECTIVE AREA(ACRES) =   20.30
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   20.30
 PEAK FLOW RATE(CFS) =   29.09
 TC(MIN) =  20.64


**************************************************************************
 FLOW PROCESS FROM NODE   114.12 TO NODE   114.22 IS CODE =   6
--------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
 UPSTREAM ELEVATION =   1301.50   DOWNSTREAM ELEVATION =   1299.80
 STREET LENGTH(FEET) =   380.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

       **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   29.09
 ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS:
      NOTE: STREETFLOW EXCEEDS TOP OF CURB.
      THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =    .71
        HALFSTREET FLOODWIDTH(FEET) =   20.00
        AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.71
        PRODUCT OF DEPTH&VELOCITY =    1.91
  STREETFLOW TRAVELTIME(MIN) =   2.34   TC(MIN) =  22.98

    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.038
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
  EFFECTIVE AREA(ACRES) =   20.30
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =   20.30   PEAK FLOW RATE(CFS) =     29.09
  END OF SUBAREA STREETFLOW HYDRAULICS:
  DEPTH(FEET) =  .71   HALFSTREET FLOODWIDTH(FEET) = 20.00
  FLOW VELOCITY(FEET/SEC.) =  2.71   DEPTH*VELOCITY =   1.91


****************************************************************************
  FLOW PROCESS FROM NODE   114.11 TO NODE   114.22 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.038
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   26.22
  EFFECTIVE AREA(ACRES) =   40.30
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =   40.30
  PEAK FLOW RATE(CFS) =   52.83
  TC(MIN) =  22.98


****************************************************************************
  FLOW PROCESS FROM NODE   114.22 TO NODE   114.10 IS CODE =   3
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  30.3 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =   7.1
  UPSTREAM NODE ELEVATION =  1299.80
  DOWNSTREAM NODE ELEVATION =  1297.00
  FLOWLENGTH(FEET) =   730.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    52.83
  TRAVEL TIME(MIN.) =   1.71    TC(MIN.) =  24.69


****************************************************************************
  FLOW PROCESS FROM NODE   114.31 TO NODE   114.10 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.952
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   49.34
 EFFECTIVE AREA(ACRES) =   80.30
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   80.30
 PEAK FLOW RATE(CFS) =   99.05
 TC(MIN) =  24.69

****************************************************************************
 FLOW PROCESS FROM NODE   114.10 TO NODE   114.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MINUTES) =  24.69
 RAINFALL INTENSITY (INCH./HOUR) =   1.95
 EFFECTIVE STREAM AREA(ACRES) =   80.30
 TOTAL STREAM AREA(ACRES) =   80.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     99.05

 CONFLUENCE INFORMATION:
 STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
 NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
----------------------------------------------------------------
   1      195.26     26.88       1.856     .58      124.60
   2       99.05     24.69       1.952     .58       80.30

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.
 SUMMARY RESULTS:
 STREAM   CONFLUENCE   EFFECTIVE
 NUMBER     Q(CFS)    AREA(ACRES)
-----------------------------------------
   1      287.31       204.90
   2      292.03       194.77
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    292.03   TIME(MINUTES) =   24.692
 EFFECTIVE AREA(ACRES) =    194.77
 TOTAL AREA(ACRES) =    208.90

****************************************************************************
 FLOW PROCESS FROM NODE   114.10 TO NODE   114.20 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  44.1 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  18.9
 UPSTREAM NODE ELEVATION =  1297.00
 DOWNSTREAM NODE ELEVATION =  1283.00
```

```
  FLOWLENGTH(FEET) =   840.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =   292.03
  TRAVEL TIME(MIN.) =    .74    TC(MIN.) =  25.43


****************************************************************************
  FLOW PROCESS FROM NODE  2001.00 TO NODE   114.20 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.918
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   28.00   SUBAREA RUNOFF(CFS) =   33.67
  EFFECTIVE AREA(ACRES) =  222.77
  AVERAGED Fm(INCH/HR) =   .580
  TOTAL AREA(ACRES) =  236.90
  PEAK FLOW RATE(CFS) =  292.03
  TC(MIN) =  25.43


****************************************************************************
  FLOW PROCESS FROM NODE   114.20 TO NODE   452.10 IS CODE =   3
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  43.5 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =  19.2
  UPSTREAM NODE ELEVATION =  1283.00
  DOWNSTREAM NODE ELEVATION =  1264.00
  FLOWLENGTH(FEET) =  1100.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =   292.03
  TRAVEL TIME(MIN.) =    .96    TC(MIN.) =  26.39


****************************************************************************
  FLOW PROCESS FROM NODE  2002.00 TO NODE   452.10 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.876
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   37.00   SUBAREA RUNOFF(CFS) =   43.09
  EFFECTIVE AREA(ACRES) =  259.77
  AVERAGED Fm(INCH/HR) =   .580
  TOTAL AREA(ACRES) =  273.90
  PEAK FLOW RATE(CFS) =  302.97
  TC(MIN) =  26.39


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

```
 FLOW PROCESS FROM NODE   452.50 TO NODE   452.10 IS CODE =   8
----------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.876
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   27.00   SUBAREA RUNOFF(CFS) =   31.45
 EFFECTIVE AREA(ACRES) =  286.77
 AVERAGED Fm(INCH/HR) =   .580
 TOTAL AREA(ACRES) =  300.90
 PEAK FLOW RATE(CFS) =  334.42
 TC(MIN) =  26.39

****************************************************************
 FLOW PROCESS FROM NODE   452.10 TO NODE   452.10 IS CODE =   1
----------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  26.39
 RAINFALL INTENSITY (INCH./HOUR) =   1.88
 EFFECTIVE STREAM AREA(ACRES) =  286.77
 TOTAL STREAM AREA(ACRES) =  300.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    334.42

****************************************************************
 FLOW PROCESS FROM NODE   452.10 TO NODE   452.10 IS CODE =   7
----------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  25.34   RAIN INTENSITY(INCH/HOUR) =  1.92
 EFFECTIVE AREA(ACRES) =    11.71
 TOTAL AREA(ACRES) =    11.71   PEAK FLOW RATE(CFS) =     19.85
 AVERAGED LOSS RATE, Fm(IN/HR) =   .582

****************************************************************
 FLOW PROCESS FROM NODE   452.10 TO NODE   452.10 IS CODE =   1
----------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MINUTES) =  25.34
 RAINFALL INTENSITY (INCH./HOUR) =   1.92
 EFFECTIVE STREAM AREA(ACRES) =   11.71
 TOTAL STREAM AREA(ACRES) =   11.71
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     19.85

****************************************************************
 FLOW PROCESS FROM NODE   452.10 TO NODE   452.10 IS CODE =   7
```

```
------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
========================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  25.34   RAIN INTENSITY(INCH/HOUR) =  1.92
  EFFECTIVE AREA(ACRES) =     8.54
  TOTAL AREA(ACRES) =     8.54   PEAK FLOW RATE(CFS) =     14.49
  AVERAGED LOSS RATE, Fm(IN/HR) =   .582


************************************************************************
  FLOW PROCESS FROM NODE   452.10 TO NODE   452.10 IS CODE =   1
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
========================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MINUTES) =  25.34
  RAINFALL INTENSITY (INCH./HOUR) =   1.92
  EFFECTIVE STREAM AREA(ACRES) =    8.54
  TOTAL STREAM AREA(ACRES) =    8.54
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     14.49

  CONFLUENCE INFORMATION:
  STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
  NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
------------------------------------------------------------------------
    1      334.42     26.39       1.876     .58      286.77
    2       19.85     25.34       1.922     .58       11.71
    3       14.49     25.34       1.922     .58        8.54

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.
  SUMMARY RESULTS:
  STREAM   CONFLUENCE   EFFECTIVE
  NUMBER     Q(CFS)    AREA(ACRES)
------------------------------------------------
    1      367.57       307.02
    2      366.91       295.60
    3      366.91       295.60
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    367.57   TIME(MINUTES) =   26.391
  EFFECTIVE AREA(ACRES) =    307.02
  TOTAL AREA(ACRES) =    321.15


************************************************************************
  FLOW PROCESS FROM NODE   452.10 TO NODE   114.30 IS CODE =   3
------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  48.8 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =  19.5
  UPSTREAM NODE ELEVATION =  1264.00
```

```
 DOWNSTREAM NODE ELEVATION =  1253.00
 FLOWLENGTH(FEET) =   700.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   367.57
 TRAVEL TIME(MIN.) =    .60    TC(MIN.) =  26.99

****************************************************************************
 FLOW PROCESS FROM NODE  2002.10 TO NODE   114.30 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.851
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   23.00   SUBAREA RUNOFF(CFS) =   26.27
 EFFECTIVE AREA(ACRES) =  330.02
 AVERAGED Fm(INCH/HR) =   .581
 TOTAL AREA(ACRES) =  344.15
 PEAK FLOW RATE(CFS) =  377.35
 TC(MIN) =  26.99

****************************************************************************
 FLOW PROCESS FROM NODE   114.30 TO NODE   114.31 IS CODE =   4
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
 DEPTH OF FLOW IN  60.0 INCH PIPE IS   6.0 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   6.8
 UPSTREAM NODE ELEVATION =  1253.00
 DOWNSTREAM NODE ELEVATION =  1233.00
 FLOWLENGTH(FEET) =  1150.00   MANNINGS N =  .013
 GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =  54
 PIPEFLOW THRU SUBAREA(CFS) =   377.35
 TRAVEL TIME(MIN.) =   2.80    TC(MIN.) =  29.79

****************************************************************************
 FLOW PROCESS FROM NODE   114.31 TO NODE   114.40 IS CODE =   4
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
 PIPEFLOW VELOCITY(FEET/SEC.) =  23.7
 UPSTREAM NODE ELEVATION =  1233.00
 DOWNSTREAM NODE ELEVATION =  1226.40
 FLOWLENGTH(FEET) =   300.00   MANNINGS N =  .013
 GIVEN PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   377.35
 TRAVEL TIME(MIN.) =    .21    TC(MIN.) =  30.00

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

```
 FLOW PROCESS FROM NODE  2003.00 TO NODE   114.40 IS CODE =   8
----------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.737
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   53.00   SUBAREA RUNOFF(CFS) =   55.10
 EFFECTIVE AREA(ACRES) =  383.02
 AVERAGED Fm(INCH/HR) =   .581
 TOTAL AREA(ACRES) =  397.15
 PEAK FLOW RATE(CFS) =  398.62
 TC(MIN) =  30.00


****************************************************************
 FLOW PROCESS FROM NODE   114.40 TO NODE   114.40 IS CODE =   1
----------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  30.00
 RAINFALL INTENSITY (INCH./HOUR) =   1.74
 EFFECTIVE STREAM AREA(ACRES) =  383.02
 TOTAL STREAM AREA(ACRES) =  397.15
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    398.62

 CONFLUENCE INFORMATION:
 STREAM    PEAK FLOW    TIME    INTENSITY     FM     EFFECTIVE
 NUMBER    RATE(CFS)   (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
----------------------------------------------------------------
   1       398.62      30.00       1.737      .58       383.02

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  1 STREAMS.
 SUMMARY RESULTS:
 STREAM    CONFLUENCE    EFFECTIVE
 NUMBER      Q(CFS)     AREA(ACRES)
-------------------------------------------
   1       398.62        383.02
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    398.62   TIME(MINUTES) =   30.002
 EFFECTIVE AREA(ACRES) =    383.02
 TOTAL AREA(ACRES) =    397.15
================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =    397.15
 EFFECTIVE AREA(ACRES) =    383.02
 PEAK FLOW RATE(CFS)    =    398.62
================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
**********************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        Copyright 1983,86,87 Advanced Engineering Software (aes)
           Ver. 4.1C  Release Date: 5/11/87  Serial # I00908

                        Especially prepared for:

                          HALL & FOREMAN
************************* DESCRIPTION OF STUDY *************************
* N.FONTANA MASTER S.D. PLAN, W. FONTANA CHANNEL LATERAL 4, ALONG CITRUS.  *
* Q 25-YR., NOT DESIGN Q.                                                 *
* JN 3547, T. ARROYO, 11/28/89.                                           *
**********************************************************************

 FILE NAME: WFONT4R.025
 TIME/DATE OF STUDY: 14: 9  11/29/1989
======================================================================
 USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
======================================================================
                  --*TIME-OF-CONCENTRATION MODEL*--

 USER SPECIFIED STORM EVENT(YEAR) =   25.00
 SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
 SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =  .95
 *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
 10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =   .970
 100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
 COMPUTED RAINFALL INTENSITY DATA:
 STORM EVENT =   25.00   1-HOUR INTENSITY(INCH/HOUR) = 1.1461
 SLOPE OF INTENSITY DURATION CURVE =  .6000


**********************************************************************
 FLOW PROCESS FROM NODE   119.00 TO NODE   119.01 IS CODE =   2
----------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
======================================================================
 DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH =  1000.00
 UPSTREAM ELEVATION =   1403.00
 DOWNSTREAM ELEVATION =   1382.00
 ELEVATION DIFFERENCE =     21.00
 TC =  .412*[( 1000.00** 3.00)/(    21.00)]** .20 =   14.140
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.728
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA RUNOFF(CFS) =     14.49
 TOTAL AREA(ACRES) =      7.50   PEAK FLOW RATE(CFS) =     14.49


**********************************************************************
 FLOW PROCESS FROM NODE   119.01 TO NODE   119.02 IS CODE =   5
----------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
 ======================================================================
  UPSTREAM NODE ELEVATION =   1382.00
 DOWNSTREAM NODE ELEVATION =   1363.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
```

```
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     14.49
 FLOW VELOCITY(FEET/SEC) =   4.41   FLOW DEPTH(FEET) =    .73
 TRAVEL TIME(MIN.) =   3.78   TC(MIN.) =  17.92

 ****************************************************************************
 FLOW PROCESS FROM NODE   119.10 TO NODE   119.02 IS CODE =   8
 ----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 ============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.367
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =    7.50   SUBAREA RUNOFF(CFS) =   12.05
 EFFECTIVE AREA(ACRES) =   15.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   15.00
 PEAK FLOW RATE(CFS) =   24.10
 TC(MIN) =  17.92

 ****************************************************************************
 FLOW PROCESS FROM NODE   119.02 TO NODE   119.12 IS CODE =   5
 ----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
 ============================================================================
 UPSTREAM NODE ELEVATION =   1363.00
 DOWNSTREAM NODE ELEVATION =   1348.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =   750.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     24.10
 FLOW VELOCITY(FEET/SEC) =   5.15   FLOW DEPTH(FEET) =    .95
 TRAVEL TIME(MIN.) =   2.43   TC(MIN.) =  20.34

 ****************************************************************************
 FLOW PROCESS FROM NODE   119.20 TO NODE   119.12 IS CODE =   8
 ----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 ============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.193
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 5-7 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .4850
 SUBAREA AREA(ACRES) =    5.30   SUBAREA RUNOFF(CFS) =    8.15
 EFFECTIVE AREA(ACRES) =   20.30
 AVERAGED Fm(INCH/HR) =   .557
 TOTAL AREA(ACRES) =   20.30
 PEAK FLOW RATE(CFS) =   29.90
 TC(MIN) =  20.34

 ****************************************************************************
 FLOW PROCESS FROM NODE   119.12 TO NODE   119.22 IS CODE =   6
 ----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
 ============================================================================
 UPSTREAM ELEVATION =   1348.50   DOWNSTREAM ELEVATION =   1346.80
 STREET LENGTH(FEET) =   400.00   CURB HEIGTH(INCHES) = 8.
  STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040
```

```
 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

       **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   29.90
 ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS:
       NOTE: STREETFLOW EXCEEDS TOP OF CURB.
       THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .71
       HALFSTREET FLOODWIDTH(FEET) =   20.00
       AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.78
       PRODUCT OF DEPTH&VELOCITY =    1.97
 STREETFLOW TRAVELTIME(MIN) =   2.40   TC(MIN) =  22.74

   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.051
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   20.30
 AVERAGED Fm(INCH/HR) =   .557
 TOTAL AREA(ACRES) =   20.30   PEAK FLOW RATE(CFS) =     29.90
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .71   HALFSTREET FLOODWIDTH(FEET) = 20.00
 FLOW VELOCITY(FEET/SEC.) =  2.78   DEPTH*VELOCITY =   1.97

 ****************************************************************************
 FLOW PROCESS FROM NODE   119.21 TO NODE   119.22 IS CODE =   8
 ----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 ============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.051
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   26.45
 EFFECTIVE AREA(ACRES) =   40.30
 AVERAGED Fm(INCH/HR) =   .569
 TOTAL AREA(ACRES) =   40.30
 PEAK FLOW RATE(CFS) =   53.76
 TC(MIN) =  22.74

 ****************************************************************************
 FLOW PROCESS FROM NODE   119.22 TO NODE   119.10 IS CODE =   3
 ----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 ============================================================================
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  30.2 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   7.3
 UPSTREAM NODE ELEVATION =  1346.80
 DOWNSTREAM NODE ELEVATION =  1344.00
 FLOWLENGTH(FEET) =   700.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    53.76
 TRAVEL TIME(MIN.) =   1.61    TC(MIN.) =  24.35

 ****************************************************************************
 FLOW PROCESS FROM NODE   119.31 TO NODE   119.10 IS CODE =   8
 ----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 ============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.969
```

```
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   49.93
 EFFECTIVE AREA(ACRES) =   80.30
 AVERAGED Fm(INCH/HR) =   .576
  TOTAL AREA(ACRES) =   80.30
  PEAK FLOW RATE(CFS) =  100.71
 TC(MIN) =  24.35

****************************************************************************
 FLOW PROCESS FROM NODE   119.10 TO NODE   114.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  30.0 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  14.7
 UPSTREAM NODE ELEVATION =  1344.00
 DOWNSTREAM NODE ELEVATION =  1297.00
 FLOWLENGTH(FEET) =  2650.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  39.00   NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   100.71
 TRAVEL TIME(MIN.) =   3.01   TC(MIN.) =  27.35

****************************************************************************
 FLOW PROCESS FROM NODE   114.10 TO NODE   114.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  27.35
  RAINFALL INTENSITY (INCH./HOUR) =   1.84
  EFFECTIVE STREAM AREA(ACRES) =   80.30
 TOTAL STREAM AREA(ACRES) =   80.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =   100.71

****************************************************************************
 FLOW PROCESS FROM NODE   114.00 TO NODE   114.01 IS CODE =   2
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH =  1000.00
 UPSTREAM ELEVATION =   1350.00
 DOWNSTREAM ELEVATION =   1330.00
 ELEVATION DIFFERENCE =   20.00
 TC =  .412*[( 1000.00** 3.00)/(   20.00)]** .20 =   14.279
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.712
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA RUNOFF(CFS) =   14.38
 TOTAL AREA(ACRES) =   7.50   PEAK FLOW RATE(CFS) =   14.38

****************************************************************************
 FLOW PROCESS FROM NODE   114.01 TO NODE   114.02 IS CODE =   5
----------------------------------------------------------------------------
 >>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1330.00
```

```
DOWNSTREAM NODE ELEVATION =   1313.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
CHANNEL BASE(FEET) =     3.00   "Z" FACTOR =  2.000
MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
CHANNEL FLOW THRU SUBAREA(CFS) =      14.38
FLOW VELOCITY(FEET/SEC) =   4.14   FLOW DEPTH(FEET) =     .77
TRAVEL TIME(MIN.) =   4.02   TC(MIN.) =  18.30

****************************************************************************
FLOW PROCESS FROM NODE   114.20 TO NODE   114.02 IS CODE =   8
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.337
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
SUBAREA AREA(ACRES) =     7.50   SUBAREA RUNOFF(CFS) =   11.85
EFFECTIVE AREA(ACRES) =   15.00
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =   15.00
PEAK FLOW RATE(CFS) =   23.69
TC(MIN) =  18.30

****************************************************************************
FLOW PROCESS FROM NODE   114.02 TO NODE   114.12 IS CODE =   5
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
UPSTREAM NODE ELEVATION =   1313.00
DOWNSTREAM NODE ELEVATION =   1301.50
CHANNEL LENGTH THRU SUBAREA(FEET) =   680.00
CHANNEL BASE(FEET) =     3.00   "Z" FACTOR =   2.000
MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
CHANNEL FLOW THRU SUBAREA(CFS) =      23.69
FLOW VELOCITY(FEET/SEC) =   4.84   FLOW DEPTH(FEET) =     .98
TRAVEL TIME(MIN.) =   2.34   TC(MIN.) =  20.64

****************************************************************************
FLOW PROCESS FROM NODE   114.30 TO NODE   114.12 IS CODE =   8
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.174
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
SUBAREA AREA(ACRES) =     5.30   SUBAREA RUNOFF(CFS) =    7.59
EFFECTIVE AREA(ACRES) =   20.30
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =   20.30
PEAK FLOW RATE(CFS) =   29.09
TC(MIN) =  20.64

****************************************************************************
FLOW PROCESS FROM NODE   114.12 TO NODE   114.22 IS CODE =   6
----------------------------------------------------------------------------
>>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
UPSTREAM ELEVATION =   1301.50   DOWNSTREAM ELEVATION =   1299.80
STREET LENGTH(FEET) =   380.00   CURB HEIGTH(INCHES) = 8.
STREET HALFWIDTH(FEET) = 20.00
```

```
 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

       **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   29.09
***STREET FLOWING FULL***
  STREETFLOW MODEL RESULTS:
       NOTE: STREETFLOW EXCEEDS TOP OF CURB.
       THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .71
       HALFSTREET FLOODWIDTH(FEET) =   20.00
       AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.71
       PRODUCT OF DEPTH&VELOCITY =    1.91
 STREETFLOW TRAVELTIME(MIN) =   2.34   TC(MIN) =  22.98

  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.038
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   20.30
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   20.30   PEAK FLOW RATE(CFS) =     29.09
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .71   HALFSTREET FLOODWIDTH(FEET) = 20.00
 FLOW VELOCITY(FEET/SEC.) =  2.71   DEPTH*VELOCITY =   1.91

****************************************************************************
 FLOW PROCESS FROM NODE   114.11 TO NODE   114.22 IS CODE =   8
 ----------------------------------------------------------------------------
  >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.038
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   26.22
 EFFECTIVE AREA(ACRES) =   40.30
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   40.30
 PEAK FLOW RATE(CFS) =   52.83
 TC(MIN) =  22.98

****************************************************************************
 FLOW PROCESS FROM NODE   114.22 TO NODE   114.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  30.3 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   7.1
 UPSTREAM NODE ELEVATION =  1299.80
 DOWNSTREAM NODE ELEVATION =  1297.00
 FLOWLENGTH(FEET) =   730.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =     52.83
 TRAVEL TIME(MIN.) =   1.71    TC(MIN.) =  24.69

****************************************************************************
 FLOW PROCESS FROM NODE   114.31 TO NODE   114.10 IS CODE =   8
----------------------------------------------------------------------------
```

```
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.952
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   49.34
 EFFECTIVE AREA(ACRES) =   80.30
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =   80.30
PEAK FLOW RATE(CFS) =   99.05
TC(MIN) =  24.69

****************************************************************************
FLOW PROCESS FROM NODE   114.10 TO NODE   114.10 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MINUTES) =  24.69
RAINFALL INTENSITY (INCH./HOUR) =   1.95
EFFECTIVE STREAM AREA(ACRES) =   80.30
TOTAL STREAM AREA(ACRES) =   80.30
PEAK FLOW RATE(CFS) AT CONFLUENCE =     99.05

CONFLUENCE INFORMATION:
STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
----------------------------------------------------------
   1      100.71     27.35      1.836     .58       80.30
   2       99.05     24.69      1.952     .58       80.30

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR  2 STREAMS.
SUMMARY RESULTS:
STREAM   CONFLUENCE   EFFECTIVE
NUMBER     Q(CFS)    AREA(ACRES)
-------------------------------------
   1      191.34       160.60
   2      198.34       152.79
COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =    198.34   TIME(MINUTES) =   24.692
EFFECTIVE AREA(ACRES) =    152.79
TOTAL AREA(ACRES) =    160.60

****************************************************************************
FLOW PROCESS FROM NODE   114.10 TO NODE   114.20 IS CODE =   3
----------------------------------------------------------------------------
>>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
DEPTH OF FLOW IN  51.0 INCH PIPE IS  39.0 INCHES
PIPEFLOW VELOCITY(FEET/SEC.) =  17.0
UPSTREAM NODE ELEVATION =  1297.00
DOWNSTREAM NODE ELEVATION =  1283.00
FLOWLENGTH(FEET) =   840.00   MANNINGS N =  .013
ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
PIPEFLOW THRU SUBAREA(CFS) =    198.34
TRAVEL TIME(MIN.) =    .82    TC(MIN.) =  25.51

****************************************************************************
FLOW PROCESS FROM NODE  2001.00 TO NODE   114.20 IS CODE =   8
----------------------------------------------------------------------------
```

```
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.914
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   28.00   SUBAREA RUNOFF(CFS) =   33.58
 EFFECTIVE AREA(ACRES) =  180.79
AVERAGED Fm(INCH/HR) =   .579
TOTAL AREA(ACRES) =  188.60
PEAK FLOW RATE(CFS) =  217.22
TC(MIN) =  25.51

****************************************************************************
FLOW PROCESS FROM NODE   114.20 TO NODE   452.10 IS CODE =   3
----------------------------------------------------------------------------
>>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
DEPTH OF FLOW IN  54.0 INCH PIPE IS  38.7 INCHES
PIPEFLOW VELOCITY(FEET/SEC.) =  17.8
UPSTREAM NODE ELEVATION =  1283.00
DOWNSTREAM NODE ELEVATION =  1264.00
FLOWLENGTH(FEET) =  1100.00   MANNINGS N =  .013
ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
PIPEFLOW THRU SUBAREA(CFS) =   217.22
TRAVEL TIME(MIN.) =   1.03    TC(MIN.) =  26.54

****************************************************************************
FLOW PROCESS FROM NODE  2002.00 TO NODE   452.10 IS CODE =   8
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.870
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
SUBAREA AREA(ACRES) =   37.00   SUBAREA RUNOFF(CFS) =   42.88
EFFECTIVE AREA(ACRES) =  217.79
AVERAGED Fm(INCH/HR) =   .580
TOTAL AREA(ACRES) =  225.60
PEAK FLOW RATE(CFS) =  252.80
TC(MIN) =  26.54

****************************************************************************
FLOW PROCESS FROM NODE   452.50 TO NODE   452.10 IS CODE =   8
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.870
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
SUBAREA AREA(ACRES) =   27.00   SUBAREA RUNOFF(CFS) =   31.29
EFFECTIVE AREA(ACRES) =  244.79
AVERAGED Fm(INCH/HR) =   .580
TOTAL AREA(ACRES) =  252.60
PEAK FLOW RATE(CFS) =  284.08
TC(MIN) =  26.54

****************************************************************************
FLOW PROCESS FROM NODE   452.10 TO NODE   114.30 IS CODE =   3
----------------------------------------------------------------------------
>>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==========================================================================
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  44.2 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  18.3
 UPSTREAM NODE ELEVATION =  1264.00
 DOWNSTREAM NODE ELEVATION =  1253.00
 FLOWLENGTH(FEET) =  700.00  MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  60.00  NUMBER OF PIPES =  1
 PIPEFLOW THRU SUBAREA(CFS) =  284.08
 TRAVEL TIME(MIN.) =  .64  TC(MIN.) =  27.18

****************************************************************************
 FLOW PROCESS FROM NODE  2002.10 TO NODE  114.30 IS CODE =  8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.843
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =  23.00  SUBAREA RUNOFF(CFS) =  26.11
 EFFECTIVE AREA(ACRES) =  267.79
 AVERAGED Fm(INCH/HR) =  .580
 TOTAL AREA(ACRES) =  275.60
 PEAK FLOW RATE(CFS) =  304.37
 TC(MIN) =  27.18

****************************************************************************
 FLOW PROCESS FROM NODE  114.30 TO NODE  114.31 IS CODE =  4
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  44.9 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  19.3
 UPSTREAM NODE ELEVATION =  1253.00
 DOWNSTREAM NODE ELEVATION =  1233.00
 FLOWLENGTH(FEET) =  1150.00  MANNINGS N =  .013
 GIVEN PIPE DIAMETER(INCH) =  60.00  NUMBER OF PIPES =  1
 PIPEFLOW THRU SUBAREA(CFS) =  304.37
 TRAVEL TIME(MIN.) =  .99  TC(MIN.) =  28.17

****************************************************************************
 FLOW PROCESS FROM NODE  114.31 TO NODE  114.40 IS CODE =  4
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
 PIPEFLOW VELOCITY(FEET/SEC.) =  19.1
 UPSTREAM NODE ELEVATION =  1233.00
 DOWNSTREAM NODE ELEVATION =  1226.40
 FLOWLENGTH(FEET) =  300.00  MANNINGS N =  .013
 GIVEN PIPE DIAMETER(INCH) =  54.00  NUMBER OF PIPES =  1
 PIPEFLOW THRU SUBAREA(CFS) =  304.37
 TRAVEL TIME(MIN.) =  .26  TC(MIN.) =  28.43

****************************************************************************
 FLOW PROCESS FROM NODE  2003.00 TO NODE  114.40 IS CODE =  8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.794
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
```

```
 SUBAREA AREA(ACRES) =    53.00   SUBAREA RUNOFF(CFS) =    57.81
 EFFECTIVE AREA(ACRES) =  320.79
 AVERAGED Fm(INCH/HR) =    .581
 TOTAL AREA(ACRES) =  328.60
 PEAK FLOW RATE(CFS) =  350.33
 TC(MIN) =  28.43

****************************************************************************
 FLOW PROCESS FROM NODE    114.40 TO NODE    114.40 IS CODE =    1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  28.43
 RAINFALL INTENSITY (INCH./HOUR) =   1.79
 EFFECTIVE STREAM AREA(ACRES) =  320.79
 TOTAL STREAM AREA(ACRES) =  328.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    350.33

 CONFLUENCE INFORMATION:
 STREAM    PEAK FLOW    TIME    INTENSITY     FM     EFFECTIVE
 NUMBER    RATE(CFS)   (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
----------------------------------------------------------------
   1       350.33      28.43       1.794      .58       320.79

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  1 STREAMS.
 SUMMARY RESULTS:
 STREAM    CONFLUENCE    EFFECTIVE
 NUMBER      Q(CFS)     AREA(ACRES)
-------------------------------------------
   1       350.33        320.79
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    350.33   TIME(MINUTES) =   28.434
 EFFECTIVE AREA(ACRES) =    320.79
 TOTAL AREA(ACRES) =    328.60
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =    328.60
 EFFECTIVE AREA(ACRES) =    320.79
 PEAK FLOW RATE(CFS)    =    350.33
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        Copyright 1983,86,87 Advanced Engineering Software (aes)
           Ver. 4.1C  Release Date: 5/11/87  Serial # I00908

                        Especially prepared for:

                           HALL & FOREMAN
************************** DESCRIPTION OF STUDY **************************
* N. FONTANA MASTER S.D. PLAN, W.FONTANA CHANNEL LATERAL 4, ALONG CITRUS.  *
* Q 100-YR., NOT DESIGN Q.                                                *
  JN 3547, T. ARROYO, 11/28/89.                                           *
**************************************************************************

 FILE NAME: WFONT4R.100
 TIME/DATE OF STUDY: 14:11  11/29/1989
==========================================================================
```

```
 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 =  .95
*USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
 10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =   .970
 100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
 COMPUTED RAINFALL INTENSITY DATA:
 STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) = 1.4700
 SLOPE OF INTENSITY DURATION CURVE =  .6000

****************************************************************************
 FLOW PROCESS FROM NODE   119.00 TO NODE   119.01 IS CODE =   2
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH =  1000.00
 UPSTREAM ELEVATION =   1403.00
 DOWNSTREAM ELEVATION =   1382.00
 ELEVATION DIFFERENCE =     21.00
 TC =  .412*[( 1000.00** 3.00)/(    21.00)]** .20 =   14.140
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.499
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA RUNOFF(CFS) =     19.69
 TOTAL AREA(ACRES) =      7.50   PEAK FLOW RATE(CFS) =     19.69

****************************************************************************
 FLOW PROCESS FROM NODE   119.01 TO NODE   119.02 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1382.00
 DOWNSTREAM NODE ELEVATION =   1363.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     19.69
 FLOW VELOCITY(FEET/SEC) =   4.86   FLOW DEPTH(FEET) =    .86
 TRAVEL TIME(MIN.) =   3.43   TC(MIN.) =  17.57

****************************************************************************
 FLOW PROCESS FROM NODE   119.10 TO NODE   119.02 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.071
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =    7.50   SUBAREA RUNOFF(CFS) =   16.80
 EFFECTIVE AREA(ACRES) =   15.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   15.00
 PEAK FLOW RATE(CFS) =   33.60
 TC(MIN) =  17.57
```

```
****************************************************************************
FLOW PROCESS FROM NODE   119.02 TO NODE   119.12 IS CODE =   5
----------------------------------------------------------------------------
 >>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1363.00
 DOWNSTREAM NODE ELEVATION =   1348.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =   750.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     33.60
 FLOW VELOCITY(FEET/SEC) =   5.58   FLOW DEPTH(FEET) =   1.14
 TRAVEL TIME(MIN.) =   2.24   TC(MIN.) =  19.81

****************************************************************************
 FLOW PROCESS FROM NODE   119.20 TO NODE   119.12 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.858
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 5-7 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .4850
 SUBAREA AREA(ACRES) =    5.30   SUBAREA RUNOFF(CFS) =   11.32
 EFFECTIVE AREA(ACRES) =   20.30
 AVERAGED Fm(INCH/HR) =   .557
 TOTAL AREA(ACRES) =   20.30
 PEAK FLOW RATE(CFS) =   42.04
 TC(MIN) =  19.81

****************************************************************************
 FLOW PROCESS FROM NODE   119.12 TO NODE   119.22 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1348.50   DOWNSTREAM ELEVATION =   1346.80
 STREET LENGTH(FEET) =   400.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   42.04
 ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS:
      NOTE: STREETFLOW EXCEEDS TOP OF CURB.
      THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .79
      HALFSTREET FLOODWIDTH(FEET) =   20.00
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.03
      PRODUCT OF DEPTH&VELOCITY =    2.38
 STREETFLOW TRAVELTIME(MIN) =   2.20   TC(MIN) =  22.01

  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.683
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
```

```
 EFFECTIVE AREA(ACRES) =   20.30
 AVERAGED Fm(INCH/HR) =   .557
 TOTAL AREA(ACRES) =   20.30   PEAK FLOW RATE(CFS) =     42.04
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .79   HALFSTREET FLOODWIDTH(FEET) = 20.00
 FLOW VELOCITY(FEET/SEC.) =  3.03   DEPTH*VELOCITY =   2.38

****************************************************************************
 FLOW PROCESS FROM NODE   119.21 TO NODE   119.22 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.683
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   37.81
 EFFECTIVE AREA(ACRES) =   40.30
 AVERAGED Fm(INCH/HR) =   .569
 TOTAL AREA(ACRES) =   40.30
 PEAK FLOW RATE(CFS) =   76.66
 TC(MIN) =  22.01

****************************************************************************
 FLOW PROCESS FROM NODE   119.22 TO NODE   119.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  34.5 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   7.9
 UPSTREAM NODE ELEVATION =  1346.80
 DOWNSTREAM NODE ELEVATION =  1344.00
 FLOWLENGTH(FEET) =   700.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  48.00   NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    76.66
 TRAVEL TIME(MIN.) =   1.47   TC(MIN.) =  23.48

****************************************************************************
 FLOW PROCESS FROM NODE   119.31 TO NODE   119.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.581
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   71.95
 EFFECTIVE AREA(ACRES) =   80.30
 AVERAGED Fm(INCH/HR) =   .576
 TOTAL AREA(ACRES) =   80.30
 PEAK FLOW RATE(CFS) =  144.91
 TC(MIN) =  23.48

****************************************************************************
 FLOW PROCESS FROM NODE   119.10 TO NODE   114.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  45.0 INCH PIPE IS  34.1 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  16.1
 UPSTREAM NODE ELEVATION =  1344.00
 DOWNSTREAM NODE ELEVATION =  1297.00
```

```
 FLOWLENGTH(FEET) =  2650.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    144.91
 TRAVEL TIME(MIN.) =   2.74    TC(MIN.) =  26.22

 ****************************************************************************
 FLOW PROCESS FROM NODE   114.10 TO NODE   114.10 IS CODE =   1
 ----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 ============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  26.22
 RAINFALL INTENSITY (INCH./HOUR) =   2.42
 EFFECTIVE STREAM AREA(ACRES) =   80.30
 TOTAL STREAM AREA(ACRES) =   80.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    144.91

 ****************************************************************************
 FLOW PROCESS FROM NODE   114.00 TO NODE   114.01 IS CODE =   2
 ----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 ============================================================================
 DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH =  1000.00
 UPSTREAM ELEVATION =   1350.00
 DOWNSTREAM ELEVATION =   1330.00
 ELEVATION DIFFERENCE =     20.00
 TC =  .412*[( 1000.00** 3.00)/(    20.00)]** .20 =   14.279
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.479
  )IL CLASSIFICATION IS "A"
 .ESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA RUNOFF(CFS) =     19.55
 TOTAL AREA(ACRES) =      7.50   PEAK FLOW RATE(CFS) =     19.55

 ****************************************************************************
 FLOW PROCESS FROM NODE   114.01 TO NODE   114.02 IS CODE =   5
 ----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
 ============================================================================
 UPSTREAM NODE ELEVATION =   1330.00
 DOWNSTREAM NODE ELEVATION =   1313.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     19.55
 FLOW VELOCITY(FEET/SEC) =   4.59   FLOW DEPTH(FEET) =    .89
 TRAVEL TIME(MIN.) =   3.63   TC(MIN.) =  17.91

 ****************************************************************************
 FLOW PROCESS FROM NODE   114.20 TO NODE   114.02 IS CODE =   8
 ----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 ============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.036
  )IL CLASSIFICATION IS "A"
 .ESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =    7.50   SUBAREA RUNOFF(CFS) =   16.57
 EFFECTIVE AREA(ACRES) =   15.00
 AVERAGED Fm(INCH/HR) =   .582
```

```
TOTAL AREA(ACRES) =   15.00
PEAK FLOW RATE(CFS) =   33.14
TC(MIN) =  17.91

****************************************************************************
FLOW PROCESS FROM NODE   114.02 TO NODE   114.12 IS CODE =   5
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
UPSTREAM NODE ELEVATION =   1313.00
DOWNSTREAM NODE ELEVATION =   1301.50
CHANNEL LENGTH THRU SUBAREA(FEET) =   680.00
CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
CHANNEL FLOW THRU SUBAREA(CFS) =    33.14
FLOW VELOCITY(FEET/SEC) =   5.29   FLOW DEPTH(FEET) =   1.17
TRAVEL TIME(MIN.) =   2.14   TC(MIN.) =  20.05

****************************************************************************
FLOW PROCESS FROM NODE   114.30 TO NODE   114.12 IS CODE =   8
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.837
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
SUBAREA AREA(ACRES) =    5.30   SUBAREA RUNOFF(CFS) =   10.76
EFFECTIVE AREA(ACRES) =   20.30
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =   20.30
 EAK FLOW RATE(CFS) =   41.21
 (MIN) =  20.05

****************************************************************************
FLOW PROCESS FROM NODE   114.12 TO NODE   114.22 IS CODE =   6
----------------------------------------------------------------------------
>>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
UPSTREAM ELEVATION =   1301.50   DOWNSTREAM ELEVATION =   1299.80
STREET LENGTH(FEET) =   380.00   CURB HEIGTH(INCHES) = 8.
STREET HALFWIDTH(FEET) = 20.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
INTERIOR STREET CROSSFALL(DECIMAL) =   .020
OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   41.21
***STREET FLOWING FULL***
  STREETFLOW MODEL RESULTS:
      NOTE: STREETFLOW EXCEEDS TOP OF CURB.
      THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .77
      HALFSTREET FLOODWIDTH(FEET) =   20.00
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.15
      PRODUCT OF DEPTH&VELOCITY =    2.41
STREETFLOW TRAVELTIME(MIN) =   2.01   TC(MIN) =  22.06

 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.679
```

```
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   20.30
 AVERAGED Fm(INCH/HR) =    .582
  TAL AREA(ACRES) =   20.30   PEAK FLOW RATE(CFS) =     41.21
 ND OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .77   HALFSTREET FLOODWIDTH(FEET) = 20.00
 FLOW VELOCITY(FEET/SEC.) =  3.15   DEPTH*VELOCITY =   2.41

****************************************************************************
 FLOW PROCESS FROM NODE   114.11 TO NODE   114.22 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.679
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   37.75
 EFFECTIVE AREA(ACRES) =   40.30
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   40.30
 PEAK FLOW RATE(CFS) =   76.07
 TC(MIN) =  22.06

****************************************************************************
 FLOW PROCESS FROM NODE   114.22 TO NODE   114.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  EPTH OF FLOW IN  48.0 INCH PIPE IS  34.9 INCHES
  IPEFLOW VELOCITY(FEET/SEC.) =   7.8
 UPSTREAM NODE ELEVATION =  1299.80
 DOWNSTREAM NODE ELEVATION =  1297.00
 FLOWLENGTH(FEET) =   730.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  48.00   NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    76.07
 TRAVEL TIME(MIN.) =   1.56   TC(MIN.) =  23.63

****************************************************************************
 FLOW PROCESS FROM NODE   114.31 TO NODE   114.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.571
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   71.62
 EFFECTIVE AREA(ACRES) =   80.30
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   80.30
 PEAK FLOW RATE(CFS) =  143.77
 TC(MIN) =  23.63

****************************************************************************
 FLOW PROCESS FROM NODE   114.10 TO NODE   114.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
```

```
 TIME OF CONCENTRATION(MINUTES) =  23.63
 RAINFALL INTENSITY (INCH./HOUR) =   2.57
 EFFECTIVE STREAM AREA(ACRES) =   80.30
 TOTAL STREAM AREA(ACRES) =   80.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    143.77

  ONFLUENCE INFORMATION:
 STREAM    PEAK FLOW    TIME    INTENSITY     FM     EFFECTIVE
 NUMBER    RATE(CFS)   (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
------------------------------------------------------------
   1       144.91      26.22       2.415      .58        80.30
   2       143.77      23.63       2.571      .58        80.30

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.
 SUMMARY RESULTS:
 STREAM    CONFLUENCE    EFFECTIVE
 NUMBER      Q(CFS)     AREA(ACRES)
--------------------------------------------
   1       277.41        160.60
   2       285.40        152.65
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    285.40   TIME(MINUTES) =   23.627
 EFFECTIVE AREA(ACRES) =    152.65
 TOTAL AREA(ACRES) =    160.60

****************************************************************************
 FLOW PROCESS FROM NODE   114.10 TO NODE   114.20 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  EPTH OF FLOW IN  57.0 INCH PIPE IS  46.6 INCHES
  PEFLOW VELOCITY(FEET/SEC.) =  18.4
 UPSTREAM NODE ELEVATION =  1297.00
 DOWNSTREAM NODE ELEVATION =  1283.00
 FLOWLENGTH(FEET) =   840.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   285.40
 TRAVEL TIME(MIN.) =    .76    TC(MIN.) =  24.39

****************************************************************************
 FLOW PROCESS FROM NODE  2001.00 TO NODE   114.20 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.523
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   28.00   SUBAREA RUNOFF(CFS) =   48.91
 EFFECTIVE AREA(ACRES) =  180.65
 AVERAGED Fm(INCH/HR) =   .579
 TOTAL AREA(ACRES) =  188.60
 PEAK FLOW RATE(CFS) =  315.98
 TC(MIN) =  24.39

****************************************************************************
 FLOW PROCESS FROM NODE   114.20 TO NODE   452.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  46.6 INCHES
```

```
 PIPEFLOW VELOCITY(FEET/SEC.) =  19.3
 UPSTREAM NODE ELEVATION =  1283.00
 DOWNSTREAM NODE ELEVATION =  1264.00
 FLOWLENGTH(FEET) =  1100.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  IPEFLOW THRU SUBAREA(CFS) =   315.98
  RAVEL TIME(MIN.) =    .95    TC(MIN.) =  25.34

****************************************************************************
 FLOW PROCESS FROM NODE  2002.00 TO NODE   452.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.466
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   37.00   SUBAREA RUNOFF(CFS) =   62.73
 EFFECTIVE AREA(ACRES) =  217.65
 AVERAGED Fm(INCH/HR) =   .580
 TOTAL AREA(ACRES) =  225.60
 PEAK FLOW RATE(CFS) =  369.43
 TC(MIN) =  25.34

****************************************************************************
 FLOW PROCESS FROM NODE   452.50 TO NODE   452.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.466
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
  UBAREA AREA(ACRES) =   27.00   SUBAREA RUNOFF(CFS) =   45.78
  FFECTIVE AREA(ACRES) =  244.65
 AVERAGED Fm(INCH/HR) =   .580
 TOTAL AREA(ACRES) =  252.60
 PEAK FLOW RATE(CFS) =  415.21
 TC(MIN) =  25.34

****************************************************************************
 FLOW PROCESS FROM NODE   452.10 TO NODE   114.30 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  69.0 INCH PIPE IS  51.1 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  20.1
 UPSTREAM NODE ELEVATION =  1264.00
 DOWNSTREAM NODE ELEVATION =  1253.00
 FLOWLENGTH(FEET) =   700.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   415.21
 TRAVEL TIME(MIN.) =    .58    TC(MIN.) =  25.92

****************************************************************************
 FLOW PROCESS FROM NODE  2002.10 TO NODE   114.30 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  .00 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.433
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   23.00   SUBAREA RUNOFF(CFS) =   38.31
```

```
 EFFECTIVE AREA(ACRES) =  267.65
 AVERAGED Fm(INCH/HR) =   .580
 TOTAL AREA(ACRES) =  275.60
 PEAK FLOW RATE(CFS) =  446.19
 TC(MIN) =  25.92

****************************************************************************
 FLOW PROCESS FROM NODE   114.30 TO NODE   114.31 IS CODE =   4
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
 DEPTH OF FLOW IN  60.0 INCH PIPE IS   6.5 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   7.2
 UPSTREAM NODE ELEVATION =  1253.00
 DOWNSTREAM NODE ELEVATION =  1233.00
 FLOWLENGTH(FEET) =  1150.00   MANNINGS N =  .013
 GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =  54
 PIPEFLOW THRU SUBAREA(CFS) =    446.19
 TRAVEL TIME(MIN.) =   2.66    TC(MIN.) =  28.58

****************************************************************************
 FLOW PROCESS FROM NODE   114.31 TO NODE   114.40 IS CODE =   4
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
 PIPEFLOW VELOCITY(FEET/SEC.) =  28.1
 UPSTREAM NODE ELEVATION =  1233.00
 DOWNSTREAM NODE ELEVATION =  1226.40
 FLOWLENGTH(FEET) =   300.00   MANNINGS N =  .013
 GIVEN PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    446.19
 TRAVEL TIME(MIN.) =    .18    TC(MIN.) =  28.76

****************************************************************************
 FLOW PROCESS FROM NODE  2003.00 TO NODE   114.40 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.285
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   53.00   SUBAREA RUNOFF(CFS) =   81.25
 EFFECTIVE AREA(ACRES) =  320.65
 AVERAGED Fm(INCH/HR) =   .581
 TOTAL AREA(ACRES) =  328.60
 PEAK FLOW RATE(CFS) =  491.96
 TC(MIN) =  28.76

****************************************************************************
 FLOW PROCESS FROM NODE   114.40 TO NODE   114.40 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MINUTES) =  28.76
  RAINFALL INTENSITY (INCH./HOUR) =   2.29
 EFFECTIVE STREAM AREA(ACRES) =  320.65
 TOTAL STREAM AREA(ACRES) =  328.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =   491.96
```

CONFLUENCE INFORMATION:

STREAM NUMBER	PEAK FLOW RATE(CFS)	TIME (MIN.)	INTENSITY (INCH/HOUR)	FM (IN/HR)	EFFECTIVE AREA(ACRES)
1	491.96	28.76	2.285	.58	320.65

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 1 STREAMS.
SUMMARY RESULTS:

STREAM NUMBER	CONFLUENCE Q(CFS)	EFFECTIVE AREA(ACRES)
1	491.96	320.65

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 491.96 TIME(MINUTES) = 28.759
EFFECTIVE AREA(ACRES) = 320.65
TOTAL AREA(ACRES) = 328.60

==========

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 328.60
EFFECTIVE AREA(ACRES) = 320.65
PEAK FLOW RATE(CFS) = 491.96

==========

END OF RATIONAL METHOD ANALYSIS

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        Copyright 1983,86,87 Advanced Engineering Software (aes)
           Ver. 4.1C  Release Date: 5/11/87  Serial # I00908

                        Especially prepared for:

                            HALL & FOREMAN
 ************************** DESCRIPTION OF STUDY **********************
* N. FONTANA MASTER S.D. PLAN, W. FONTANA CHANNEL LAT. 5, WEST OF CITRU
* Q 100-25 YEAR, DESIGN Q, INCLUDES OVERFLOW FROM BASELINE AVENUE
* JN 3547
 **************************************************************************

  FILE NAME: WFONLAT5.DES
  TIME/DATE OF STUDY:  0:27   1/ 1/1980
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =   .970
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   25.00   1-HOUR INTENSITY(INCH/HOUR) = 1.1461
  SLOPE OF INTENSITY DURATION CURVE =  .6000



**************************************************************************
  FLOW PROCESS FROM NODE   125.00 TO NODE   125.01 IS CODE =   2
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

  TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
  INITIAL SUBAREA FLOW-LENGTH =  1000.00
  UPSTREAM ELEVATION =   1395.00
  DOWNSTREAM ELEVATION =   1375.00
  ELEVATION DIFFERENCE =     20.00
  TC =  .412*[( 1000.00** 3.00)/(    20.00)]** .20 =   14.279
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.712
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA RUNOFF(CFS) =     14.38
  TOTAL AREA(ACRES) =      7.50   PEAK FLOW RATE(CFS) =     14.38
```

```
****************************************************************************
 FLOW PROCESS FROM NODE   125.01 TO NODE   126.01 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1375.00
 DOWNSTREAM NODE ELEVATION =   1355.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     14.38
 FLOW VELOCITY(FEET/SEC) =   4.38   FLOW DEPTH(FEET) =    .73
 TRAVEL TIME(MIN.) =   3.80   TC(MIN.) =  18.08


****************************************************************************
 FLOW PROCESS FROM NODE   126.00 TO NODE   126.01 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.354
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =    7.50   SUBAREA RUNOFF(CFS) =   11.96
 EFFECTIVE AREA(ACRES) =   15.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   15.00
 PEAK FLOW RATE(CFS) =   23.92
 TC(MIN) =  18.08


****************************************************************************
 FLOW PROCESS FROM NODE   126.01 TO NODE   126.10 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1355.00
 DOWNSTREAM NODE ELEVATION =   1342.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   650.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     23.92
 FLOW VELOCITY(FEET/SEC) =   5.11   FLOW DEPTH(FEET) =    .95
 TRAVEL TIME(MIN.) =   2.12   TC(MIN.) =  20.20


****************************************************************************
 FLOW PROCESS FROM NODE   125.12 TO NODE   126.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.202
 SOIL CLASSIFICATION IS "A"
```

```
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     5.00   SUBAREA RUNOFF(CFS) =     7.29
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =    20.00
 PEAK FLOW RATE(CFS) =   29.17
 TC(MIN) =  20.20


****************************************************************************
 FLOW PROCESS FROM NODE   126.10 TO NODE   127.10 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1342.00   DOWNSTREAM ELEVATION =   1341.00
 STREET LENGTH(FEET) =   350.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
 INTERIOR STREET CROSSFALL(DECIMAL) =    .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =    .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

       **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   29.17
 ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS:
       NOTE: STREETFLOW EXCEEDS TOP OF CURB.
       THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .75
       HALFSTREET FLOODWIDTH(FEET) =   20.00
       AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.37
       PRODUCT OF DEPTH&VELOCITY =    1.77
 STREETFLOW TRAVELTIME(MIN) =   2.46   TC(MIN) =  22.66

   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.056
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =      .00   SUBAREA RUNOFF(CFS) =      .00
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =   20.00   PEAK FLOW RATE(CFS) =     29.17
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .75   HALFSTREET FLOODWIDTH(FEET) = 20.00
 FLOW VELOCITY(FEET/SEC.) =  2.37   DEPTH*VELOCITY =   1.77


****************************************************************************
 FLOW PROCESS FROM NODE   127.00 TO NODE   127.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.056
```

```
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   26.52
 EFFECTIVE AREA(ACRES) =   40.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   40.00
 PEAK FLOW RATE(CFS) =   53.05
 TC(MIN) =  22.66


****************************************************************************
 FLOW PROCESS FROM NODE   127.10 TO NODE   128.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  29.3 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   7.9
 UPSTREAM NODE ELEVATION =  1341.00
 DOWNSTREAM NODE ELEVATION =  1337.50
 FLOWLENGTH(FEET) =   670.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    53.05
 TRAVEL TIME(MIN.) =   1.41    TC(MIN.) =  24.07


****************************************************************************
 FLOW PROCESS FROM NODE   128.21 TO NODE   128.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.983
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   50.42
 EFFECTIVE AREA(ACRES) =   80.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   80.00
 PEAK FLOW RATE(CFS) =  100.85
 TC(MIN) =  24.07


****************************************************************************
 FLOW PROCESS FROM NODE   128.10 TO NODE   129.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  39.2 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   9.2
 UPSTREAM NODE ELEVATION =  1337.50
 DOWNSTREAM NODE ELEVATION =  1334.00
 FLOWLENGTH(FEET) =   670.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   100.85
```

```
 TRAVEL TIME(MIN.) =    1.22     TC(MIN.) =  25.29

****************************************************************************
 FLOW PROCESS FROM NODE    129.00 TO NODE    129.10 IS CODE =    8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.925
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =    40.00   SUBAREA RUNOFF(CFS) =    48.34
 EFFECTIVE AREA(ACRES) =  120.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =  120.00
 PEAK FLOW RATE(CFS) =  145.03
 TC(MIN) =  25.29


****************************************************************************
 FLOW PROCESS FROM NODE    129.10 TO NODE    129.10 IS CODE =    1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  25.29
 RAINFALL INTENSITY (INCH./HOUR) =   1.92
 EFFECTIVE STREAM AREA(ACRES) =  120.00
 TOTAL STREAM AREA(ACRES) =  120.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    145.03


****************************************************************************
 FLOW PROCESS FROM NODE    221.20 TO NODE    221.20 IS CODE =    7
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  18.70   RAIN INTENSITY(INCH/HOUR) =  2.31
 EFFECTIVE AREA(ACRES) =    68.50
 TOTAL AREA(ACRES) =    68.50   PEAK FLOW RATE(CFS) =    134.80
 AVERAGED LOSS RATE, Fm(IN/HR) =    .582


****************************************************************************
 FLOW PROCESS FROM NODE    221.20 TO NODE    129.10 IS CODE =    6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =    1385.00   DOWNSTREAM ELEVATION =    1334.00
 STREET LENGTH(FEET) =  2650.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
 INTERIOR STREET CROSSFALL(DECIMAL) =    .020
```

```
 OUTSIDE STREET CROSSFALL(DECIMAL)  =    .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

       **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =  134.80
 ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS:
       NOTE: STREETFLOW EXCEEDS TOP OF CURB.
       THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .88
       HALFSTREET FLOODWIDTH(FEET) =   20.00
       AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.58
       PRODUCT OF DEPTH&VELOCITY =    6.70
 STREETFLOW TRAVELTIME(MIN) =   5.83   TC(MIN) =  24.53

   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.960
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   68.50
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   68.50   PEAK FLOW RATE(CFS) =    134.80
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .88   HALFSTREET FLOODWIDTH(FEET) = 20.00
 FLOW VELOCITY(FEET/SEC.) =  7.58   DEPTH*VELOCITY =   6.70


****************************************************************************
 FLOW PROCESS FROM NODE   129.10 TO NODE   129.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MINUTES) =  24.53
 RAINFALL INTENSITY (INCH./HOUR) =   1.96
 EFFECTIVE STREAM AREA(ACRES) =   68.50
 TOTAL STREAM AREA(ACRES) =   68.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    134.80

 CONFLUENCE INFORMATION:
 STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
 NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
----------------------------------------------------------------------
   1      145.03     25.29       1.925     .58      120.00
   2      134.80     24.53       1.960     .58       68.50

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.
 SUMMARY RESULTS:
 STREAM   CONFLUENCE   EFFECTIVE
 NUMBER     Q(CFS)    AREA(ACRES)
--------------------------------------------
```

```
    1       276.36        188.50
    2       279.20        184.90
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    279.20   TIME(MINUTES) =   24.526
  EFFECTIVE AREA(ACRES) =    184.90
  TOTAL AREA(ACRES) =    188.50


****************************************************************************
  FLOW PROCESS FROM NODE   129.10 TO NODE   124.10 IS CODE =   3
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  DEPTH OF FLOW IN  57.0 INCH PIPE IS  45.5 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =  18.4
  UPSTREAM NODE ELEVATION =  1334.00
  DOWNSTREAM NODE ELEVATION =  1288.00
  FLOWLENGTH(FEET) =  2750.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    279.20
  TRAVEL TIME(MIN.) =   2.49    TC(MIN.) =  27.02


****************************************************************************
  FLOW PROCESS FROM NODE   124.10 TO NODE   124.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MINUTES) =  27.02
  RAINFALL INTENSITY (INCH./HOUR) =   1.85
  EFFECTIVE STREAM AREA(ACRES) =  184.90
  TOTAL STREAM AREA(ACRES) =  188.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    279.20


****************************************************************************
  FLOW PROCESS FROM NODE   120.00 TO NODE   120.01 IS CODE =   2
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

  TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
  INITIAL SUBAREA FLOW-LENGTH =  1000.00
  UPSTREAM ELEVATION =   1344.00
  DOWNSTREAM ELEVATION =   1325.00
  ELEVATION DIFFERENCE =     19.00
  TC =  .412*[( 1000.00** 3.00)/(    19.00)]** .20 =   14.426
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.695
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA RUNOFF(CFS) =     14.27
  TOTAL AREA(ACRES) =      7.50   PEAK FLOW RATE(CFS) =     14.27
```

```
**************************************************************************
 FLOW PROCESS FROM NODE   120.01 TO NODE   120.02 IS CODE =   5
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
 UPSTREAM NODE ELEVATION =   1325.00
 DOWNSTREAM NODE ELEVATION =   1308.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     14.27
 FLOW VELOCITY(FEET/SEC) =   4.35   FLOW DEPTH(FEET) =    .73
 TRAVEL TIME(MIN.) =   3.83   TC(MIN.) =  18.26


**************************************************************************
 FLOW PROCESS FROM NODE   120.12 TO NODE   120.02 IS CODE =   8
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.340
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =    7.50   SUBAREA RUNOFF(CFS) =   11.87
 EFFECTIVE AREA(ACRES) =   15.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   15.00
 PEAK FLOW RATE(CFS) =   23.73
 TC(MIN) =  18.26


**************************************************************************
 FLOW PROCESS FROM NODE   120.02 TO NODE   121.10 IS CODE =   5
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
 UPSTREAM NODE ELEVATION =   1308.00
 DOWNSTREAM NODE ELEVATION =   1296.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   320.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     23.73
 FLOW VELOCITY(FEET/SEC) =   6.48   FLOW DEPTH(FEET) =    .80
 TRAVEL TIME(MIN.) =    .82   TC(MIN.) =  19.08


**************************************************************************
 FLOW PROCESS FROM NODE   121.00 TO NODE   121.10 IS CODE =   8
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
```

```
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.279
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =    5.00   SUBAREA RUNOFF(CFS) =    7.64
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   20.00
 PEAK FLOW RATE(CFS) =   30.55
 TC(MIN) =  19.08


****************************************************************************
 FLOW PROCESS FROM NODE   121.10 TO NODE   122.10 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1296.00   DOWNSTREAM ELEVATION =   1295.00
 STREET LENGTH(FEET) =   320.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 32.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  24.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   30.55
   STREETFLOW MODEL RESULTS:
      NOTE: STREETFLOW EXCEEDS TOP OF CURB.
      THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .76
      HALFSTREET FLOODWIDTH(FEET) =   24.13
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.31
      PRODUCT OF DEPTH&VELOCITY =    1.76
 STREETFLOW TRAVELTIME(MIN) =   2.31   TC(MIN) =  21.39

  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.128
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   20.00   PEAK FLOW RATE(CFS) =     30.55
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .76   HALFSTREET FLOODWIDTH(FEET) = 24.13
 FLOW VELOCITY(FEET/SEC.) =  2.31   DEPTH*VELOCITY =   1.76


****************************************************************************
 FLOW PROCESS FROM NODE   122.00 TO NODE   122.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.128
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   27.83
 EFFECTIVE AREA(ACRES) =   40.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   40.00
 PEAK FLOW RATE(CFS) =   55.66
 TC(MIN) =  21.39

****************************************************************************
 FLOW PROCESS FROM NODE   122.10 TO NODE   123.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  28.5 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   9.3
 UPSTREAM NODE ELEVATION =  1295.00
 DOWNSTREAM NODE ELEVATION =  1290.00
 FLOWLENGTH(FEET) =   640.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    55.66
 TRAVEL TIME(MIN.) =   1.15    TC(MIN.) =  22.54

****************************************************************************
 FLOW PROCESS FROM NODE   123.00 TO NODE   123.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.062
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   53.28
 EFFECTIVE AREA(ACRES) =   80.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   80.00
 PEAK FLOW RATE(CFS) =  106.57
 TC(MIN) =  22.54

****************************************************************************
 FLOW PROCESS FROM NODE   123.10 TO NODE   124.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  54.0 INCH PIPE IS  44.0 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   7.7
 UPSTREAM NODE ELEVATION =  1290.00
 DOWNSTREAM NODE ELEVATION =  1288.00
 FLOWLENGTH(FEET) =   640.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
```

```
  PIPEFLOW THRU SUBAREA(CFS) =    106.57
  TRAVEL TIME(MIN.) =   1.39    TC(MIN.) =  23.93

****************************************************************************
  FLOW PROCESS FROM NODE   124.00 TO NODE   124.10 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.989
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   50.67
  EFFECTIVE AREA(ACRES) =  120.00
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =  120.00
  PEAK FLOW RATE(CFS) =  152.01
  TC(MIN) =  23.93

****************************************************************************
  FLOW PROCESS FROM NODE   124.10 TO NODE   124.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MINUTES) =  23.93
  RAINFALL INTENSITY (INCH./HOUR) =   1.99
  EFFECTIVE STREAM AREA(ACRES) =  120.00
  TOTAL STREAM AREA(ACRES) =  120.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    152.01

  CONFLUENCE INFORMATION:
  STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
  NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
----------------------------------------------------------------------------
    1      279.20     27.02       1.850     .58      184.90
    2      152.01     23.93       1.989     .58      120.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.
  SUMMARY RESULTS:
  STREAM   CONFLUENCE   EFFECTIVE
  NUMBER     Q(CFS)    AREA(ACRES)
-------------------------------------------
    1      416.13       304.90
    2      426.56       283.79
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    426.56   TIME(MINUTES) =   23.931
  EFFECTIVE AREA(ACRES) =    283.79
  TOTAL AREA(ACRES) =    308.50

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

```
 FLOW PROCESS FROM NODE   124.10 TO NODE   124.10 IS CODE =   1
----------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
======================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  23.93
 RAINFALL INTENSITY (INCH./HOUR) =   1.99
 EFFECTIVE STREAM AREA(ACRES) =  283.79
 TOTAL STREAM AREA(ACRES) =  308.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    426.56


**********************************************************************
 FLOW PROCESS FROM NODE   129.10 TO NODE   129.10 IS CODE =   7
----------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
======================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  24.17   RAIN INTENSITY(INCH/HOUR) =  1.98
 EFFECTIVE AREA(ACRES) =    37.60
 TOTAL AREA(ACRES) =    37.60   PEAK FLOW RATE(CFS) =     66.10
 AVERAGED LOSS RATE, Fm(IN/HR) =   .582


**********************************************************************
 FLOW PROCESS FROM NODE   129.10 TO NODE   124.10 IS CODE =   6
----------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
======================================================================
 UPSTREAM ELEVATION =   1334.00   DOWNSTREAM ELEVATION =   1288.00
 STREET LENGTH(FEET) =  1750.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

       **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   66.10
 ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS:
       NOTE: STREETFLOW EXCEEDS TOP OF CURB.
       THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .71
       HALFSTREET FLOODWIDTH(FEET) =   20.00
       AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.15
       PRODUCT OF DEPTH&VELOCITY =    4.35
 STREETFLOW TRAVELTIME(MIN) =   4.74   TC(MIN) =  28.91

   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.776
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
```

```
 SUBAREA AREA(ACRES) =      .00   SUBAREA RUNOFF(CFS) =      .00
 EFFECTIVE AREA(ACRES) =   37.60
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =   37.60   PEAK FLOW RATE(CFS) =     66.10
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .71   HALFSTREET FLOODWIDTH(FEET) = 20.00
 FLOW VELOCITY(FEET/SEC.) =  6.15   DEPTH*VELOCITY =   4.35

****************************************************************************
 FLOW PROCESS FROM NODE   124.10 TO NODE   124.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MINUTES) =  28.91
 RAINFALL INTENSITY (INCH./HOUR) =   1.78
 EFFECTIVE STREAM AREA(ACRES) =   37.60
 TOTAL STREAM AREA(ACRES) =   37.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     66.10

****************************************************************************
 FLOW PROCESS FROM NODE   124.10 TO NODE    24.10 IS CODE =   7
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  24.34   RAIN INTENSITY(INCH/HOUR) =  1.97
 EFFECTIVE AREA(ACRES) =    36.50
 TOTAL AREA(ACRES) =    36.50   PEAK FLOW RATE(CFS) =     63.90
 AVERAGED LOSS RATE, Fm(IN/HR) =   .582

****************************************************************************
 FLOW PROCESS FROM NODE   124.10 TO NODE   124.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION(MINUTES) =  24.34
 RAINFALL INTENSITY (INCH./HOUR) =   1.97
 EFFECTIVE STREAM AREA(ACRES) =   36.50
 TOTAL STREAM AREA(ACRES) =   36.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     63.90

 CONFLUENCE INFORMATION:
 STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
 NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
----------------------------------------------------------------
   1      426.56     23.93      1.989      .58     283.79
   2       66.10     28.91      1.776      .58      37.60
   3       63.90     24.34      1.969      .58      36.50
```

```
  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.
  SUMMARY RESULTS:
  STREAM    CONFLUENCE    EFFECTIVE
  NUMBER      Q(CFS)     AREA(ACRES)
-------------------------------------------
    1       554.78        350.80
    2       482.97        357.89
    3       549.01        351.94
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    554.78   TIME(MINUTES) =   23.931
  EFFECTIVE AREA(ACRES) =    350.80
  TOTAL AREA(ACRES) =    382.60


****************************************************************************
  FLOW PROCESS FROM NODE   124.10 TO NODE   450.10 IS CODE =   3
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  DEPTH OF FLOW IN  75.0 INCH PIPE IS  58.9 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =  21.5
  UPSTREAM NODE ELEVATION =  1288.00
  DOWNSTREAM NODE ELEVATION =  1273.00
  FLOWLENGTH(FEET) =   950.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  75.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    554.78
  TRAVEL TIME(MIN.) =    .74    TC(MIN.) =  24.67


****************************************************************************
  FLOW PROCESS FROM NODE   450.00 TO NODE   450.10 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.954
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   16.40   SUBAREA RUNOFF(CFS) =   20.24
  EFFECTIVE AREA(ACRES) =  367.20
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =  399.00
  PEAK FLOW RATE(CFS) =  554.78
  TC(MIN) =  24.67


****************************************************************************
  FLOW PROCESS FROM NODE   450.10 TO NODE   450.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MINUTES) =  24.67
  RAINFALL INTENSITY (INCH./HOUR) =   1.95
```

```
  EFFECTIVE STREAM AREA(ACRES) =  367.20
  TOTAL STREAM AREA(ACRES) =  399.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    554.78


****************************************************************************
  FLOW PROCESS FROM NODE   450.10 TO NODE   450.10 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  25.13   RAIN INTENSITY(INCH/HOUR) =  1.93
  EFFECTIVE AREA(ACRES) =     5.00
  TOTAL AREA(ACRES) =     5.00   PEAK FLOW RATE(CFS) =     25.13
  AVERAGED LOSS RATE, Fm(IN/HR) =   .582


****************************************************************************
  FLOW PROCESS FROM NODE   450.10 TO NODE   450.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MINUTES) =  25.13
  RAINFALL INTENSITY (INCH./HOUR) =   1.93
  EFFECTIVE STREAM AREA(ACRES) =    5.00
  TOTAL STREAM AREA(ACRES) =    5.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     25.13

  CONFLUENCE INFORMATION:
  STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
  NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
----------------------------------------------------------------------
    1      554.78     24.67       1.954     .58      367.20
    2       25.13     25.13       1.932     .58        5.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.
  SUMMARY RESULTS:
  STREAM   CONFLUENCE   EFFECTIVE
  NUMBER     Q(CFS)    AREA(ACRES)
-----------------------------------------
    1      579.85       372.11
    2      571.18       372.20
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    579.85   TIME(MINUTES) =   24.669
  EFFECTIVE AREA(ACRES) =    372.11
  TOTAL AREA(ACRES) =    404.00


****************************************************************************
  FLOW PROCESS FROM NODE   450.10 TO NODE   452.10 IS CODE =   4
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
```

```
  >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
  PIPEFLOW VELOCITY(FEET/SEC.) =  16.2
  UPSTREAM NODE ELEVATION =  1273.00
  DOWNSTREAM NODE ELEVATION =  1266.00
  FLOWLENGTH(FEET) =  1500.00   MANNINGS N =  .013
  GIVEN PIPE DIAMETER(INCH) =  81.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    579.85
  TRAVEL TIME(MIN.) =   1.54    TC(MIN.) =  26.21

****************************************************************************
  FLOW PROCESS FROM NODE   452.00 TO NODE   452.10 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.884
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   38.80   SUBAREA RUNOFF(CFS) =   45.46
  EFFECTIVE AREA(ACRES) =  410.91
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =  442.80
  PEAK FLOW RATE(CFS) =  579.85
  TC(MIN) =  26.21

****************************************************************************
  FLOW PROCESS FROM NODE   452.10 TO NODE   452.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MINUTES) =  26.21
  RAINFALL INTENSITY (INCH./HOUR) =   1.88
  EFFECTIVE STREAM AREA(ACRES) =  410.91
  TOTAL STREAM AREA(ACRES) =  442.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    579.85

****************************************************************************
  FLOW PROCESS FROM NODE   452.10 TO NODE   452.10 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  27.11   RAIN INTENSITY(INCH/HOUR) =  1.85
  EFFECTIVE AREA(ACRES) =    12.20
  TOTAL AREA(ACRES) =    12.20   PEAK FLOW RATE(CFS) =     19.60
  AVERAGED LOSS RATE, Fm(IN/HR) =   .582

****************************************************************************
  FLOW PROCESS FROM NODE   452.10 TO NODE   452.10 IS CODE =   1
----------------------------------------------------------------------------
```

```
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MINUTES) =  27.11
  RAINFALL INTENSITY (INCH./HOUR) =   1.85
  EFFECTIVE STREAM AREA(ACRES) =   12.20
  TOTAL STREAM AREA(ACRES) =   12.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     19.60

  CONFLUENCE INFORMATION:
  STREAM    PEAK FLOW    TIME    INTENSITY     FM     EFFECTIVE
  NUMBER    RATE(CFS)   (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
--------------------------------------------------------------------------------
    1       579.85      26.21       1.884      .58       410.91
    2        19.60      27.11       1.846      .58        12.20

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.
  SUMMARY RESULTS:
  STREAM    CONFLUENCE    EFFECTIVE
  NUMBER      Q(CFS)     AREA(ACRES)
--------------------------------------------------
    1       599.36        422.70
    2       582.65        423.11
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    599.36   TIME(MINUTES) =   26.212
  EFFECTIVE AREA(ACRES) =    422.70
  TOTAL AREA(ACRES) =    455.00


****************************************************************************
  FLOW PROCESS FROM NODE   452.10 TO NODE   453.10 IS CODE =   4
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
  DEPTH OF FLOW IN  81.0 INCH PIPE IS  57.7 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =  22.0
  UPSTREAM NODE ELEVATION =  1266.00
  DOWNSTREAM NODE ELEVATION =  1251.00
  FLOWLENGTH(FEET) =   980.00   MANNINGS N =  .013
  GIVEN PIPE DIAMETER(INCH) =  81.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    599.36
  TRAVEL TIME(MIN.) =    .74    TC(MIN.) =  26.96


****************************************************************************
  FLOW PROCESS FROM NODE   453.00 TO NODE   453.10 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.852
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
```

```
  SUBAREA AREA(ACRES) =   10.00   SUBAREA RUNOFF(CFS) =   11.43
  EFFECTIVE AREA(ACRES) =  432.70
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =  465.00
  PEAK FLOW RATE(CFS) =  599.36
  TC(MIN) =  26.96

****************************************************************************
  FLOW PROCESS FROM NODE   453.10 TO NODE   456.10 IS CODE =   3
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  DEPTH OF FLOW IN  81.0 INCH PIPE IS  61.1 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =  20.7
  UPSTREAM NODE ELEVATION =  1251.00
  DOWNSTREAM NODE ELEVATION =  1229.00
  FLOWLENGTH(FEET) =  1650.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  81.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =   599.36
  TRAVEL TIME(MIN.) =   1.33    TC(MIN.) =  28.29

****************************************************************************
  FLOW PROCESS FROM NODE   456.00 TO NODE   456.10 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.800
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   24.00   SUBAREA RUNOFF(CFS) =   26.30
  EFFECTIVE AREA(ACRES) =  456.70
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =  489.00
  PEAK FLOW RATE(CFS) =  599.36
  TC(MIN) =  28.29

****************************************************************************
  FLOW PROCESS FROM NODE   457.00 TO NODE   456.10 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.800
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   26.00   SUBAREA RUNOFF(CFS) =   28.49
  EFFECTIVE AREA(ACRES) =  482.70
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =  515.00
  PEAK FLOW RATE(CFS) =  599.36
  TC(MIN) =  28.29
```

```
**********************************************************************
 FLOW PROCESS FROM NODE   456.10 TO NODE   456.10 IS CODE =   1
----------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
======================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  28.29
 RAINFALL INTENSITY (INCH./HOUR) =   1.80
 EFFECTIVE STREAM AREA(ACRES) =  482.70
 TOTAL STREAM AREA(ACRES) =  515.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    599.36

 CONFLUENCE INFORMATION:
 STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
 NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
----------------------------------------------------------------
   1      599.36     28.29       1.800     .58      482.70

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  1 STREAMS.
 SUMMARY RESULTS:
 STREAM   CONFLUENCE   EFFECTIVE
 NUMBER     Q(CFS)    AREA(ACRES)
-------------------------------------------
   1      599.36       482.70
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    599.36   TIME(MINUTES) =   28.285
 EFFECTIVE AREA(ACRES) =    482.70
 TOTAL AREA(ACRES) =    515.00
======================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =    515.00
 EFFECTIVE AREA(ACRES) =    482.70
 PEAK FLOW RATE(CFS)    =    599.36
======================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        Copyright 1983,86,87 Advanced Engineering Software (aes)
           Ver. 4.1C  Release Date: 5/11/87  Serial # I00908

                        Especially prepared for:

                          HALL & FOREMAN
 ************************* DESCRIPTION OF STUDY *************************
 * N.FONTANA MASTER S.D PLAN,WEST FONTANA CHANNEL LATERAL 5,WEST OF CITRUS  *
 * Q 25 YR, NOT FOR DESIGN Q                                               *
 * VENKI.N, JN 3547, 5/1/89                                                *
  *************************************************************************

  FILE NAME: WFONLAT5.025
  TIME/DATE OF STUDY: 13:15   5/ 1/1989
 ==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
 ==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =  .95
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =   .970
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   25.00   1-HOUR INTENSITY(INCH/HOUR) = 1.1461
  SLOPE OF INTENSITY DURATION CURVE =  .6000


**************************************************************************
  FLOW PROCESS FROM NODE   125.00 TO NODE   125.01 IS CODE =   2
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 ==========================================================================
  DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

  TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
  INITIAL SUBAREA FLOW-LENGTH =  1000.00
  UPSTREAM ELEVATION =   1395.00
  DOWNSTREAM ELEVATION =   1375.00
  ELEVATION DIFFERENCE =     20.00
  TC =  .412*[( 1000.00** 3.00)/(    20.00)]** .20 =   14.279
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.712
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
  SUBAREA RUNOFF(CFS) =     14.38
  TOTAL AREA(ACRES) =      7.50   PEAK FLOW RATE(CFS) =     14.38


**************************************************************************
  FLOW PROCESS FROM NODE   125.01 TO NODE   126.01 IS CODE =   5
--------------------------------------------------------------------------
   >>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
 ==========================================================================
  UPSTREAM NODE ELEVATION =   1375.00
  DOWNSTREAM NODE ELEVATION =   1355.00
```

```
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     14.38
 FLOW VELOCITY(FEET/SEC) =   4.38   FLOW DEPTH(FEET) =    .73
 TRAVEL TIME(MIN.) =   3.80   TC(MIN.) =  18.08

****************************************************************************
 FLOW PROCESS FROM NODE   126.00 TO NODE   126.01 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.354
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =    7.50   SUBAREA RUNOFF(CFS) =   11.96
 EFFECTIVE AREA(ACRES) =   15.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   15.00
 PEAK FLOW RATE(CFS) =   23.92
 TC(MIN) =  18.08

****************************************************************************
 FLOW PROCESS FROM NODE   126.01 TO NODE   126.10 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1355.00
 DOWNSTREAM NODE ELEVATION =   1342.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   650.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     23.92
 FLOW VELOCITY(FEET/SEC) =   5.11   FLOW DEPTH(FEET) =    .95
 TRAVEL TIME(MIN.) =   2.12   TC(MIN.) =  20.20

****************************************************************************
 FLOW PROCESS FROM NODE   125.12 TO NODE   126.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.202
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =    5.00   SUBAREA RUNOFF(CFS) =    7.29
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   20.00
 PEAK FLOW RATE(CFS) =   29.17
 TC(MIN) =  20.20

****************************************************************************
 FLOW PROCESS FROM NODE   126.10 TO NODE   127.10 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1342.00   DOWNSTREAM ELEVATION =   1341.00
 STREET LENGTH(FEET) =   350.00   CURB HEIGTH(INCHES) = 8.
```

```
STREET HALFWIDTH(FEET) = 20.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
INTERIOR STREET CROSSFALL(DECIMAL) =   .020
OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   29.17
***STREET FLOWING FULL***
  STREETFLOW MODEL RESULTS:
      NOTE: STREETFLOW EXCEEDS TOP OF CURB.
      THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .75
      HALFSTREET FLOODWIDTH(FEET) =   20.00
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.37
      PRODUCT OF DEPTH&VELOCITY =    1.77
STREETFLOW TRAVELTIME(MIN) =   2.46   TC(MIN) =  22.66

  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.056
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
EFFECTIVE AREA(ACRES) =   20.00
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =   20.00   PEAK FLOW RATE(CFS) =     29.17
END OF SUBAREA STREETFLOW HYDRAULICS:
DEPTH(FEET) =  .75   HALFSTREET FLOODWIDTH(FEET) = 20.00
FLOW VELOCITY(FEET/SEC.) =  2.37   DEPTH*VELOCITY =   1.77

****************************************************************************
FLOW PROCESS FROM NODE   127.00 TO NODE   127.10 IS CODE =   8
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.056
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   26.52
EFFECTIVE AREA(ACRES) =   40.00
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =   40.00
PEAK FLOW RATE(CFS) =   53.05
TC(MIN) =  22.66

****************************************************************************
FLOW PROCESS FROM NODE   127.10 TO NODE   128.10 IS CODE =   3
----------------------------------------------------------------------------
>>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
DEPTH OF FLOW IN  39.0 INCH PIPE IS  29.3 INCHES
PIPEFLOW VELOCITY(FEET/SEC.) =   7.9
UPSTREAM NODE ELEVATION =  1341.00
 OWNSTREAM NODE ELEVATION =  1337.50
FLOWLENGTH(FEET) =   670.00   MANNINGS N =  .013
ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
PIPEFLOW THRU SUBAREA(CFS) =     53.05
TRAVEL TIME(MIN.) =   1.41    TC(MIN.) =  24.07
```

```
**********************************************************************
 FLOW PROCESS FROM NODE   128.21 TO NODE   128.10 IS CODE =   8
----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.983
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   50.42
 EFFECTIVE AREA(ACRES) =   80.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   80.00
 PEAK FLOW RATE(CFS) =  100.85
 TC(MIN) =  24.07

**********************************************************************
 FLOW PROCESS FROM NODE   128.10 TO NODE   129.10 IS CODE =   3
----------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
======================================================================
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  39.2 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   9.2
 UPSTREAM NODE ELEVATION =  1337.50
 DOWNSTREAM NODE ELEVATION =  1334.00
 FLOWLENGTH(FEET) =   670.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  48.00   NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   100.85
 TRAVEL TIME(MIN.) =   1.22   TC(MIN.) =  25.29

**********************************************************************
 FLOW PROCESS FROM NODE   129.00 TO NODE   129.10 IS CODE =   8
----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.925
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   48.34
 EFFECTIVE AREA(ACRES) =  120.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  120.00
 PEAK FLOW RATE(CFS) =  145.03
 TC(MIN) =  25.29

**********************************************************************
 FLOW PROCESS FROM NODE   129.10 TO NODE   124.10 IS CODE =   3
----------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
======================================================================
 DEPTH OF FLOW IN  45.0 INCH PIPE IS  35.1 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  15.7
 UPSTREAM NODE ELEVATION =  1334.00
 DOWNSTREAM NODE ELEVATION =  1288.00
 FLOWLENGTH(FEET) =  2750.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  45.00   NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   145.03
```

$Q_{100} = 211.1$ CFS, $Q_{100-25} = 66.1$ CFS
Pro-rated Area = 37.6 Ac., $(T_c)_{100} = 24.17$ min.
$F_m = 0.582$

```
 TRAVEL TIME(MIN.) =    2.92     TC(MIN.) =  28.20

****************************************************************************
 FLOW PROCESS FROM NODE    124.10 TO NODE    124.10 IS CODE =    1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  28.20
 RAINFALL INTENSITY (INCH./HOUR) =   1.80
 EFFECTIVE STREAM AREA(ACRES) =  120.00
 TOTAL STREAM AREA(ACRES) =  120.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    145.03

****************************************************************************
 FLOW PROCESS FROM NODE    120.00 TO NODE    120.01 IS CODE =    2
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH =  1000.00
 UPSTREAM ELEVATION =   1344.00
 DOWNSTREAM ELEVATION =   1325.00
 ELEVATION DIFFERENCE =     19.00
 TC =  .412*[( 1000.00** 3.00)/(    19.00)]** .20 =   14.426
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.695
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA RUNOFF(CFS) =     14.27
 TOTAL AREA(ACRES) =      7.50   PEAK FLOW RATE(CFS) =     14.27

****************************************************************************
 FLOW PROCESS FROM NODE    120.01 TO NODE    120.02 IS CODE =    5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1325.00
 DOWNSTREAM NODE ELEVATION =   1308.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     14.27
 FLOW VELOCITY(FEET/SEC) =   4.35   FLOW DEPTH(FEET) =    .73
 TRAVEL TIME(MIN.) =   3.83   TC(MIN.) =  18.26

****************************************************************************
 FLOW PROCESS FROM NODE    120.12 TO NODE    120.02 IS CODE =    8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.340
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =    7.50   SUBAREA RUNOFF(CFS) =   11.87
 EFFECTIVE AREA(ACRES) =   15.00
 AVERAGED Fm(INCH/HR) =   .582
```

```
TOTAL AREA(ACRES) =   15.00
PEAK FLOW RATE(CFS) =   23.73
TC(MIN) =  18.26

****************************************************************************
FLOW PROCESS FROM NODE   120.02 TO NODE   121.10 IS CODE =   5
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
UPSTREAM NODE ELEVATION =   1308.00
DOWNSTREAM NODE ELEVATION =   1296.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   320.00
CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
CHANNEL FLOW THRU SUBAREA(CFS) =    23.73
FLOW VELOCITY(FEET/SEC) =   6.48   FLOW DEPTH(FEET) =    .80
TRAVEL TIME(MIN.) =    .82   TC(MIN.) =  19.08

****************************************************************************
FLOW PROCESS FROM NODE   121.00 TO NODE   121.10 IS CODE =   8
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.279
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
SUBAREA AREA(ACRES) =    5.00   SUBAREA RUNOFF(CFS) =    7.64
EFFECTIVE AREA(ACRES) =   20.00
\VERAGED Fm(INCH/HR) =   .582
.OTAL AREA(ACRES) =   20.00
PEAK FLOW RATE(CFS) =   30.55
TC(MIN) =  19.08

****************************************************************************
FLOW PROCESS FROM NODE   121.10 TO NODE   122.10 IS CODE =   6
----------------------------------------------------------------------------
>>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
UPSTREAM ELEVATION =   1296.00   DOWNSTREAM ELEVATION =   1295.00
STREET LENGTH(FEET) =   320.00   CURB HEIGTH(INCHES) = 8.
STREET HALFWIDTH(FEET) = 32.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  24.00
INTERIOR STREET CROSSFALL(DECIMAL) =   .020
OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

     **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   30.55
  STREETFLOW MODEL RESULTS:
     NOTE: STREETFLOW EXCEEDS TOP OF CURB.
     THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .76
     HALFSTREET FLOODWIDTH(FEET) =   24.13
     AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.31
     PRODUCT OF DEPTH&VELOCITY =    1.76
STREETFLOW TRAVELTIME(MIN) =   2.31   TC(MIN) =  21.39
```

```
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.128
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =   20.00   PEAK FLOW RATE(CFS) =     30.55
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .76   HALFSTREET FLOODWIDTH(FEET) = 24.13
 FLOW VELOCITY(FEET/SEC.) =  2.31   DEPTH*VELOCITY =   1.76

****************************************************************************
 FLOW PROCESS FROM NODE   122.00 TO NODE   122.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.128
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   27.83
 EFFECTIVE AREA(ACRES) =   40.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =   40.00
 PEAK FLOW RATE(CFS) =   55.66
 TC(MIN) =  21.39

****************************************************************************
 FLOW PROCESS FROM NODE   122.10 TO NODE   123.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  28.5 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   9.3
 UPSTREAM NODE ELEVATION =  1295.00
 DOWNSTREAM NODE ELEVATION =  1290.00
 FLOWLENGTH(FEET) =   640.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  36.00   NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =     55.66
 TRAVEL TIME(MIN.) =   1.15   TC(MIN.) =  22.54

****************************************************************************
 FLOW PROCESS FROM NODE   122.10 TO NODE   123.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  28.5 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   9.3
 UPSTREAM NODE ELEVATION =  1295.00
 DOWNSTREAM NODE ELEVATION =  1290.00
 FLOWLENGTH(FEET) =   640.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  36.00   NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =     55.66
  RAVEL TIME(MIN.) =   1.15   TC(MIN.) =  23.69

****************************************************************************
 FLOW PROCESS FROM NODE   123.00 TO NODE   123.10 IS CODE =   8
```

```
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.001
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   51.10
EFFECTIVE AREA(ACRES) =   80.00
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =   80.00
PEAK FLOW RATE(CFS) =  102.20
TC(MIN) =  23.69

****************************************************************************
FLOW PROCESS FROM NODE   123.10 TO NODE   124.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
DEPTH OF FLOW IN  54.0 INCH PIPE IS  42.2 INCHES
PIPEFLOW VELOCITY(FEET/SEC.) =   7.7
UPSTREAM NODE ELEVATION =  1290.00
DOWNSTREAM NODE ELEVATION =  1288.00
FLOWLENGTH(FEET) =   640.00   MANNINGS N =  .013
ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
PIPEFLOW THRU SUBAREA(CFS) =   102.20
TRAVEL TIME(MIN.) =   1.39    TC(MIN.) =  25.09

****************************************************************************
FLOW PROCESS FROM NODE   124.00 TO NODE   124.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.934
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   48.67
EFFECTIVE AREA(ACRES) =  120.00
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =  120.00
PEAK FLOW RATE(CFS) =  146.02
TC(MIN) =  25.09

****************************************************************************
FLOW PROCESS FROM NODE   124.10 TO NODE   124.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MINUTES) =  25.09
RAINFALL INTENSITY (INCH./HOUR) =   1.93
EFFECTIVE STREAM AREA(ACRES) =  120.00
TOTAL STREAM AREA(ACRES) =  120.00
PEAK FLOW RATE(CFS) AT CONFLUENCE =    146.02

CONFLUENCE INFORMATION:
STREAM    PEAK FLOW    TIME    INTENSITY     FM     EFFECTIVE
NUMBER    RATE(CFS)   (MIN.) (INCH/HOUR)  (IN/HR) AREA(ACRES)
----------------------------------------------------------------
```

$Q_{100} = 209.9$ CFS, $Q_{100-25} = 63.9$ CFS
Pro-rated Area = 36.5 Ac, $(T_c)_{100} = 24.34$ MIN
$F_m = 0.582$

```
   1       145.03      28.20       1.803      .58       120.00
   2       146.02      25.09       1.934      .58       120.00

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.
 SUMMARY RESULTS:
 STREAM    CONFLUENCE    EFFECTIVE
 NUMBER      Q(CFS)     AREA(ACRES)
-----------------------------------------
   1       276.88        240.00
   2       288.89        226.74
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    288.89   TIME(MINUTES) =   25.085
 EFFECTIVE AREA(ACRES) =    226.74
 TOTAL AREA(ACRES) =    240.00

****************************************************************************
 FLOW PROCESS FROM NODE   124.10 TO NODE   450.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  44.7 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  18.4
 UPSTREAM NODE ELEVATION =  1288.00
 DOWNSTREAM NODE ELEVATION =  1273.00
 FLOWLENGTH(FEET) =   950.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    288.89
 TRAVEL TIME(MIN.) =    .86    TC(MIN.) =  25.95

****************************************************************************
 FLOW PROCESS FROM NODE   450.00 TO NODE   450.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.895
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   16.40   SUBAREA RUNOFF(CFS) =   19.38
 EFFECTIVE AREA(ACRES) =  243.14
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  256.40
 PEAK FLOW RATE(CFS) =  288.89
 TC(MIN) =  25.95

 Q100 = 27.99,  Q100-25 = 8.6 CFS
 Pre-Developed Area = 5.0 Ac,  (Tc)100 = 25.13 MIN.
 Fm = 0.582

****************************************************************************
 FLOW PROCESS FROM NODE   450.10 TO NODE   452.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  75.0 INCH PIPE IS  56.6 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  11.6
 UPSTREAM NODE ELEVATION =  1273.00
 DOWNSTREAM NODE ELEVATION =  1266.00
 FLOWLENGTH(FEET) =  1500.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  75.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    288.89
 TRAVEL TIME(MIN.) =   2.15    TC(MIN.) =  28.10
```

```
**********************************************************************
 FLOW PROCESS FROM NODE   452.00 TO NODE   452.10 IS CODE =   8
----------------------------------------------------------------------
 >>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.807
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   38.80   SUBAREA RUNOFF(CFS) =   42.77
 EFFECTIVE AREA(ACRES) =  281.94
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  295.20
 PEAK FLOW RATE(CFS) =  310.81
 TC(MIN) =  28.10

**********************************************************************
 FLOW PROCESS FROM NODE   452.10 TO NODE   453.10 IS CODE =   3
----------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
======================================================================
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  48.6 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  18.2
 UPSTREAM NODE ELEVATION =  1266.00
 DOWNSTREAM NODE ELEVATION =  1251.00
 FLOWLENGTH(FEET) =   980.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   310.81
 TRAVEL TIME(MIN.) =    .90    TC(MIN.) =  28.99

**********************************************************************
 FLOW PROCESS FROM NODE   453.00 TO NODE   453.10 IS CODE =   8
----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.773
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   10.00   SUBAREA RUNOFF(CFS) =   10.72
 EFFECTIVE AREA(ACRES) =  291.94
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  305.20
 PEAK FLOW RATE(CFS) =  312.97
 TC(MIN) =  28.99

**********************************************************************
 FLOW PROCESS FROM NODE   453.10 TO NODE   456.10 IS CODE =   3
----------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
======================================================================
 DEPTH OF FLOW IN  63.0 INCH PIPE IS  48.4 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  17.5
 UPSTREAM NODE ELEVATION =  1251.00
 DOWNSTREAM NODE ELEVATION =  1229.00
 FLOWLENGTH(FEET) =  1650.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   312.97
```

$Q_{100} = 62.36$ CFS, $Q_{100-25} = 19.6$ CFS

Pro-rated Area = 12.2 Ac, $(T_c)_{100} = 27.11$ MIN

$Fm = 0.582$

```
 TRAVEL TIME(MIN.) =    1.57    TC(MIN.) =  30.56

****************************************************************************
 FLOW PROCESS FROM NODE   456.00 TO NODE   456.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.718
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   24.00   SUBAREA RUNOFF(CFS) =   24.54
 EFFECTIVE AREA(ACRES) =  315.94
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  329.20
 PEAK FLOW RATE(CFS) =  323.01
 TC(MIN) =  30.56

****************************************************************************
 FLOW PROCESS FROM NODE   457.00 TO NODE   456.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.718
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   26.00   SUBAREA RUNOFF(CFS) =   26.58
 EFFECTIVE AREA(ACRES) =  341.94
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  355.20
 PEAK FLOW RATE(CFS) =  349.59
 TC(MIN) =  30.56

****************************************************************************
 FLOW PROCESS FROM NODE   456.10 TO NODE   456.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  30.56
 RAINFALL INTENSITY (INCH./HOUR) =   1.72
 EFFECTIVE STREAM AREA(ACRES) =  341.94
 TOTAL STREAM AREA(ACRES) =  355.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    349.59

 CONFLUENCE INFORMATION:
 STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
 NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
----------------------------------------------------------------
   1      349.59     30.56       1.718     .58      341.94

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  1 STREAMS.
 SUMMARY RESULTS:
 STREAM   CONFLUENCE   EFFECTIVE
  UMBER     Q(CFS)    AREA(ACRES)
-------------------------------------------
   1      349.59       341.94
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    349.59   TIME(MINUTES) =   30.561
```

```
 EFFECTIVE AREA(ACRES) =    341.94
 TOTAL AREA(ACRES) =    355.20
 ================================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =    355.20
 EFFECTIVE AREA(ACRES) =    341.94
 PEAK FLOW RATE(CFS)    =    349.59
 ================================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        Copyright 1983,86,87 Advanced Engineering Software (aes)
           Ver. 4.1C  Release Date: 5/11/87  Serial # I00908

                        Especially prepared for:

                          HALL & FOREMAN
 ************************* DESCRIPTION OF STUDY *************************
* N.FONTANA MASTER S.D PLAN, W.FONTANA CHANNEL LATERAL 5,WEST OF CITRUS    *
* Q 100 YR, NOT FOR DESIGN                                                *
* VENKI.N, JN 3547, 5/23/89                                               *
 *************************************************************************

 FILE NAME: WFONLAT5.100
 TIME/DATE OF STUDY: 14:34   5/23/1989
=========================================================================
 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 =  .95
 *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
 10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =   .970
 100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
 COMPUTED RAINFALL INTENSITY DATA:
 STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) = 1.4700
 SLOPE OF INTENSITY DURATION CURVE =  .6000


**************************************************************************
 FLOW PROCESS FROM NODE   125.00 TO NODE   125.01 IS CODE =   2
--------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
 DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH =  1000.00
 UPSTREAM ELEVATION =   1395.00
 DOWNSTREAM ELEVATION =   1375.00
 ELEVATION DIFFERENCE =     20.00
 TC =  .412*[( 1000.00** 3.00)/(    20.00)]** .20 =   14.279
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.479
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA RUNOFF(CFS) =     19.55
 TOTAL AREA(ACRES) =      7.50   PEAK FLOW RATE(CFS) =     19.55


**************************************************************************
 FLOW PROCESS FROM NODE   125.01 TO NODE   126.01 IS CODE =   5
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
```

```
==========================================================================
 UPSTREAM NODE ELEVATION =   1375.00
 DOWNSTREAM NODE ELEVATION =   1355.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     19.55
 FLOW VELOCITY(FEET/SEC) =   4.82   FLOW DEPTH(FEET) =    .86
 TRAVEL TIME(MIN.) =   3.46   TC(MIN.) =  17.74

**************************************************************************
 FLOW PROCESS FROM NODE   126.00 TO NODE   126.01 IS CODE =   8
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.054
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =    7.50   SUBAREA RUNOFF(CFS) =   16.69
 EFFECTIVE AREA(ACRES) =   15.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   15.00
 PEAK FLOW RATE(CFS) =   33.37
 TC(MIN) =  17.74

**************************************************************************
 FLOW PROCESS FROM NODE   126.01 TO NODE   126.10 IS CODE =   5
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
 UPSTREAM NODE ELEVATION =   1355.00
 DOWNSTREAM NODE ELEVATION =   1342.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   650.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     33.37
 FLOW VELOCITY(FEET/SEC) =   5.76   FLOW DEPTH(FEET) =   1.11
 TRAVEL TIME(MIN.) =   1.88   TC(MIN.) =  19.61

**************************************************************************
 FLOW PROCESS FROM NODE   125.12 TO NODE   126.10 IS CODE =   8
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.875
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =    5.00   SUBAREA RUNOFF(CFS) =   10.32
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   20.00
 PEAK FLOW RATE(CFS) =   41.28
 TC(MIN) =  19.61

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

```
 FLOW PROCESS FROM NODE   126.10 TO NODE   127.10 IS CODE =   6
----------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
 ======================================================================
 UPSTREAM ELEVATION =   1342.00   DOWNSTREAM ELEVATION =   1341.00
 STREET LENGTH(FEET) =   350.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   41.28
 ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS:
      NOTE: STREETFLOW EXCEEDS TOP OF CURB.
      THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .82
      HALFSTREET FLOODWIDTH(FEET) =   20.00
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.67
      PRODUCT OF DEPTH&VELOCITY =    2.21
 STREETFLOW TRAVELTIME(MIN) =   2.18   TC(MIN) =  21.80

  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.699
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   20.00   PEAK FLOW RATE(CFS) =     41.28
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .82   HALFSTREET FLOODWIDTH(FEET) = 20.00
 FLOW VELOCITY(FEET/SEC.) =  2.67   DEPTH*VELOCITY =   2.21

 ****************************************************************************
 FLOW PROCESS FROM NODE   127.00 TO NODE   127.10 IS CODE =   8
----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.699
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   38.10
 EFFECTIVE AREA(ACRES) =   40.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   40.00
 PEAK FLOW RATE(CFS) =   76.21
 TC(MIN) =  21.80

 ****************************************************************************
 FLOW PROCESS FROM NODE   127.10 TO NODE   128.10 IS CODE =   3
----------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==========================================================================
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  33.2 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =   8.7
  PSTREAM NODE ELEVATION =  1341.00
  DOWNSTREAM NODE ELEVATION =  1337.50
  FLOWLENGTH(FEET) =   670.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    76.21
  TRAVEL TIME(MIN.) =   1.28    TC(MIN.) =  23.08

**************************************************************************
  FLOW PROCESS FROM NODE   128.21 TO NODE   128.10 IS CODE =   8
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.608
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
  SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   72.93
  EFFECTIVE AREA(ACRES) =   80.00
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =   80.00
  PEAK FLOW RATE(CFS) =  145.87
  TC(MIN) =  23.08

**************************************************************************
  FLOW PROCESS FROM NODE   128.10 TO NODE   129.10 IS CODE =   3
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  DEPTH OF FLOW IN  57.0 INCH PIPE IS  42.7 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =  10.2
  UPSTREAM NODE ELEVATION =  1337.50
  DOWNSTREAM NODE ELEVATION =  1334.00
  FLOWLENGTH(FEET) =   670.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =   145.87
  TRAVEL TIME(MIN.) =   1.09    TC(MIN.) =  24.17

**************************************************************************
  FLOW PROCESS FROM NODE   129.00 TO NODE   129.10 IS CODE =   8
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.537
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
  SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   70.37
  EFFECTIVE AREA(ACRES) =  120.00
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =  120.00
  PEAK FLOW RATE(CFS) =  211.10
  TC(MIN) =  24.17

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

```
 FLOW PROCESS FROM NODE   129.10 TO NODE   124.10 IS CODE =   3
----------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
======================================================================
 DEPTH OF FLOW IN  51.0 INCH PIPE IS  41.4 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  17.1
 UPSTREAM NODE ELEVATION =  1334.00
 DOWNSTREAM NODE ELEVATION =  1288.00
 FLOWLENGTH(FEET) =  2750.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    211.10
 TRAVEL TIME(MIN.) =   2.68    TC(MIN.) =  26.85

**********************************************************************
 FLOW PROCESS FROM NODE   124.10 TO NODE   124.10 IS CODE =   1
----------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
======================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  26.85
 RAINFALL INTENSITY (INCH./HOUR) =   2.38
 EFFECTIVE STREAM AREA(ACRES) =  120.00
 TOTAL STREAM AREA(ACRES) =  120.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    211.10

**********************************************************************
 FLOW PROCESS FROM NODE   120.00 TO NODE   120.01 IS CODE =   2
----------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
======================================================================
 DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH =  1000.00
 UPSTREAM ELEVATION =   1344.00
 DOWNSTREAM ELEVATION =   1325.00
 ELEVATION DIFFERENCE =     19.00
 TC =  .412*[( 1000.00** 3.00)/(    19.00)]** .20 =   14.426
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.457
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA RUNOFF(CFS) =     19.41
 TOTAL AREA(ACRES) =      7.50   PEAK FLOW RATE(CFS) =     19.41

**********************************************************************
 FLOW PROCESS FROM NODE   120.01 TO NODE   120.02 IS CODE =   5
----------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
======================================================================
  PSTREAM NODE ELEVATION =   1325.00
 DOWNSTREAM NODE ELEVATION =   1308.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     19.41
```

```
 FLOW VELOCITY(FEET/SEC) =   4.56   FLOW DEPTH(FEET) =    .89
 TRAVEL TIME(MIN.) =   3.66   TC(MIN.) =  18.08

****************************************************************************
 FLOW PROCESS FROM NODE   120.12 TO NODE   120.02 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.019
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =    7.50   SUBAREA RUNOFF(CFS) =   16.45
 EFFECTIVE AREA(ACRES) =   15.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   15.00
 PEAK FLOW RATE(CFS) =   32.90
 TC(MIN) =  18.08

****************************************************************************
 FLOW PROCESS FROM NODE   120.02 TO NODE   121.10 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1308.00
 DOWNSTREAM NODE ELEVATION =   1296.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   320.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =    32.90
 FLOW VELOCITY(FEET/SEC) =   7.04   FLOW DEPTH(FEET) =    .95
 TRAVEL TIME(MIN.) =    .76   TC(MIN.) =  18.84

****************************************************************************
 FLOW PROCESS FROM NODE   121.00 TO NODE   121.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.945
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =    5.00   SUBAREA RUNOFF(CFS) =   10.64
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   20.00
 PEAK FLOW RATE(CFS) =   42.54
 TC(MIN) =  18.84

****************************************************************************
 FLOW PROCESS FROM NODE   121.10 TO NODE   122.10 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1296.00   DOWNSTREAM ELEVATION =   1295.00
 STREET LENGTH(FEET) =   320.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 32.00
```

```
 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  24.00
 INTERIOR STREET CROSSFALL(DECIMAL) =    .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =    .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   42.54
   STREETFLOW MODEL RESULTS:
      NOTE: STREETFLOW EXCEEDS TOP OF CURB.
      THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =    .84
      HALFSTREET FLOODWIDTH(FEET) =   27.87
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.48
      PRODUCT OF DEPTH&VELOCITY =    2.08
 STREETFLOW TRAVELTIME(MIN) =   2.15   TC(MIN) =  20.99

  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.761
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =   20.00   PEAK FLOW RATE(CFS) =     42.54
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .84   HALFSTREET FLOODWIDTH(FEET) = 27.87
 FLOW VELOCITY(FEET/SEC.) =  2.48   DEPTH*VELOCITY =   2.08


****************************************************************************
 FLOW PROCESS FROM NODE   122.00 TO NODE   122.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.761
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   39.22
 EFFECTIVE AREA(ACRES) =   40.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =   40.00
 PEAK FLOW RATE(CFS) =   78.44
 TC(MIN) =  20.99


****************************************************************************
 FLOW PROCESS FROM NODE   122.10 TO NODE   123.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  31.3 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  10.2
 UPSTREAM NODE ELEVATION =  1295.00
 DOWNSTREAM NODE ELEVATION =  1290.00
 FLOWLENGTH(FEET) =   640.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =     78.44
```

```
 TRAVEL TIME(MIN.) =   1.05    TC(MIN.) =  22.03

 ****************************************************************************
 FLOW PROCESS FROM NODE   123.00 TO NODE   123.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.681
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   75.58
 EFFECTIVE AREA(ACRES) =   80.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   80.00
 PEAK FLOW RATE(CFS) =  151.16
 TC(MIN) =  22.03

****************************************************************************
 FLOW PROCESS FROM NODE   123.10 TO NODE   124.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  63.0 INCH PIPE IS  48.3 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   8.5
 UPSTREAM NODE ELEVATION =  1290.00
 DOWNSTREAM NODE ELEVATION =  1288.00
 FLOWLENGTH(FEET) =   640.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   151.16
 TRAVEL TIME(MIN.) =   1.26    TC(MIN.) =  23.29

****************************************************************************
 FLOW PROCESS FROM NODE   124.00 TO NODE   124.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.594
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   72.42
 EFFECTIVE AREA(ACRES) =  120.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  120.00
 PEAK FLOW RATE(CFS) =  217.26
 TC(MIN) =  23.29

****************************************************************************
 FLOW PROCESS FROM NODE   124.10 TO NODE   124.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MINUTES) =  23.29
 RAINFALL INTENSITY (INCH./HOUR) =   2.59
```

```
 EFFECTIVE STREAM AREA(ACRES) =  120.00
 TOTAL STREAM AREA(ACRES) =  120.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    217.26

 CONFLUENCE INFORMATION:
 STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
 NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
-------------------------------------------------------------
   1      211.10     26.85       2.382     .58      120.00
   2      217.26     23.29       2.594     .58      120.00

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.
 SUMMARY RESULTS:
 STREAM   CONFLUENCE   EFFECTIVE
 NUMBER     Q(CFS)    AREA(ACRES)
-------------------------------------------
   1      405.46       240.00
   2      421.96       224.10
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    421.96   TIME(MINUTES) =   23.290
 EFFECTIVE AREA(ACRES) =    224.10
 TOTAL AREA(ACRES) =    240.00


****************************************************************************
 FLOW PROCESS FROM NODE   124.10 TO NODE   450.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  69.0 INCH PIPE IS  51.7 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  20.2
 UPSTREAM NODE ELEVATION =  1288.00
 DOWNSTREAM NODE ELEVATION =  1273.00
 FLOWLENGTH(FEET) =   950.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    421.96
 TRAVEL TIME(MIN.) =    .78    TC(MIN.) =  24.07


****************************************************************************
 FLOW PROCESS FROM NODE   450.00 TO NODE   450.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.543
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   16.40   SUBAREA RUNOFF(CFS) =   28.94
 EFFECTIVE AREA(ACRES) =  240.50
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  256.40
 PEAK FLOW RATE(CFS) =  424.38
  C(MIN) =  24.07


****************************************************************************
 FLOW PROCESS FROM NODE   450.10 TO NODE   452.10 IS CODE =   3
----------------------------------------------------------------------------
```

```
>>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
 EPTH OF FLOW IN  84.0 INCH PIPE IS  68.7 INCHES
PIPEFLOW VELOCITY(FEET/SEC.) =  12.6
UPSTREAM NODE ELEVATION =  1273.00
DOWNSTREAM NODE ELEVATION =  1266.00
FLOWLENGTH(FEET) =  1500.00   MANNINGS N =  .013
ESTIMATED PIPE DIAMETER(INCH) =  84.00    NUMBER OF PIPES =   1
PIPEFLOW THRU SUBAREA(CFS) =   424.38
TRAVEL TIME(MIN.) =   1.98    TC(MIN.) =  26.06

****************************************************************************
FLOW PROCESS FROM NODE   452.00 TO NODE   452.10 IS CODE =   8
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.425
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
SUBAREA AREA(ACRES) =   38.80   SUBAREA RUNOFF(CFS) =   64.35
EFFECTIVE AREA(ACRES) =  279.30
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =  295.20
PEAK FLOW RATE(CFS) =  463.18
TC(MIN) =  26.06

****************************************************************************
FLOW PROCESS FROM NODE   452.10 TO NODE   453.10 IS CODE =   3
----------------------------------------------------------------------------
>>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
DEPTH OF FLOW IN  72.0 INCH PIPE IS  53.8 INCHES
PIPEFLOW VELOCITY(FEET/SEC.) =  20.5
UPSTREAM NODE ELEVATION =  1266.00
DOWNSTREAM NODE ELEVATION =  1251.00
FLOWLENGTH(FEET) =   980.00   MANNINGS N =  .013
ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
PIPEFLOW THRU SUBAREA(CFS) =   463.18
TRAVEL TIME(MIN.) =    .80    TC(MIN.) =  26.86

****************************************************************************
FLOW PROCESS FROM NODE   453.00 TO NODE   453.10 IS CODE =   8
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.381
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
SUBAREA AREA(ACRES) =   10.00   SUBAREA RUNOFF(CFS) =   16.19
:FFECTIVE AREA(ACRES) =  289.30
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =  305.20
PEAK FLOW RATE(CFS) =  468.44
TC(MIN) =  26.86
```

```
**********************************************************************
 FLOW PROCESS FROM NODE   453.10 TO NODE   456.10 IS CODE =   3
 ----------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
======================================================================
 DEPTH OF FLOW IN  72.0 INCH PIPE IS  57.9 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  19.2
 UPSTREAM NODE ELEVATION =  1251.00
 DOWNSTREAM NODE ELEVATION =  1229.00
 FLOWLENGTH(FEET) =  1650.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    468.44
 TRAVEL TIME(MIN.) =   1.43    TC(MIN.) =  28.29

**********************************************************************
 FLOW PROCESS FROM NODE   456.00 TO NODE   456.10 IS CODE =   8
----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.308
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   24.00   SUBAREA RUNOFF(CFS) =   37.28
 EFFECTIVE AREA(ACRES) =  313.30
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  329.20
 PEAK FLOW RATE(CFS) =  486.71
 TC(MIN) =  28.29

**********************************************************************
 FLOW PROCESS FROM NODE   457.00 TO NODE   456.10 IS CODE =   8
----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.308
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   26.00   SUBAREA RUNOFF(CFS) =   40.39
 EFFECTIVE AREA(ACRES) =  339.30
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  355.20
 PEAK FLOW RATE(CFS) =  527.10
 TC(MIN) =  28.29

**********************************************************************
 FLOW PROCESS FROM NODE   456.10 TO NODE   456.10 IS CODE =   1
----------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
 ======================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  28.29
 RAINFALL INTENSITY (INCH./HOUR) =   2.31
 EFFECTIVE STREAM AREA(ACRES) =  339.30
 TOTAL STREAM AREA(ACRES) =  355.20
```

PEAK FLOW RATE(CFS) AT CONFLUENCE = 527.10

CONFLUENCE INFORMATION:

TREAM NUMBER	PEAK FLOW RATE(CFS)	TIME (MIN.)	INTENSITY (INCH/HOUR)	FM (IN/HR)	EFFECTIVE AREA(ACRES)
1	527.10	28.29	2.308	.58	339.30

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR 1 STREAMS.
SUMMARY RESULTS:

STREAM NUMBER	CONFLUENCE Q(CFS)	EFFECTIVE AREA(ACRES)
1	527.10	339.30

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 527.10 TIME(MINUTES) = 28.287
EFFECTIVE AREA(ACRES) = 339.30
TOTAL AREA(ACRES) = 355.20

==========

END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 355.20
EFFECTIVE AREA(ACRES) = 339.30
PEAK FLOW RATE(CFS) = 527.10

==========

END OF RATIONAL METHOD ANALYSIS

RATIONAL METHOD USING AES3OFT

PROJECT: T5 COUNTY

STORM FREQUENCY: JOB NO.

SUB-AREA DESIGNATION	NODAL REACH	FLOW CODE	UPPER-LOWER ELEVATIONS	TRAVEL LENGTH	LAND USE	SOIL GROUP	AREA	NOTES AND/OR DATA
125	125.01	2	1395 / 1375	1000			7.5	
125.01	126.01	5	1375 / 1355	1000				
126.0	126.01	8					7.5	
126.01	126.1	5	1355 / 1342	650				
125.12	126.1	8					5.0	
126.1	127.1	6	1342 / 1341	350				
127	127.1	8					20 Ac.	
127.1	128.1	3	1341 / 1337.5	670				
128.21	128.1	8					40 Ac	
128.10	129.10	3	1337.5 / 1334	670				
129	129.10	8					40 Ac.	
129.10	129.1	1						
221.2	221.2	7	/					Q = 1479, Pre-dev. Area = 60.3 Ac. Tc = 26.06 From Baselin Out. flow Line
221.2	129.1	6	1385 / 1334	2610				
129.1	129.1	1						
129.10	124.1	3	1334 / 1288	2750				
124.1	124.1	1						
120	120.01	2	1344 / 1325	1000			7.5	

RATIONAL METHOD USING AES3OFT

PROJECT: TS _____ COUNTY

STORM FREQUENCY: _____ JOB NO. _____

SUBAREA DESIGNATION	NODAL REACH	FLOW CODE	UPPER-LOWER ELEVATIONS	TRAVEL LENGTH	LAND USE	SOIL GROUP	AREA	NOTES AND/OR DATA
120.01	120.02	5	1325 / 1308	1000				
120.12	120.02	8					7.5	
120.02	121.1	5	1308 / 1296	700				
121	121.1	8					5Ac	
121.1	122.1	6	1296 / 1295	320				
122	122.1	8					20 Ac	
122.1	123.1	3	1295 / 1290	640				
123.0	123.1	8					40	
123.1	124.1	3	1290 / 1288	640				
124	124.1	8					40 Ac	
~~124.1~~	~~450.1~~	3	~~1288~~ / 1273	950				
124.1	121.1	1						29 [illegible]
124.1	124.1	1						1 [illegible]
129.1	129.1	7						Area = 65.1 [illegible] Prorated Area = 37.6 (Tc)100 = 24.1 min, Fm = 0.[illegible]
129.1	124.1	6	1334 / 1288	1750				
124.1	124.1	1						Area = 63.9 CFS Prorated Area = 36.5 Ac (Tc)100 = 24.5 min, Fm = 0.[illegible]
124.1	124.1	7						
124.1	124.1	1						

RATIONAL METHOD USING AESSOFT

PROJECT: TS _____ COUNTY _____

STORM FREQUENCY: _____ JOB NO. _____

SUBAREA DESIGNATION	NODAL REACH	FLOW CODE	UPPER-LOWER ELEVATIONS	TRAVEL LENGTH	LAND USE	SOIL GROUP	AREA	NOTES AND/OR DATA
124.1	450-1	3	1288 / 1273	950				
450	450-1	8					16.4 Ac	
450-1	450-1	1						10 2
450-1	450-1	7						(for 450 Pond) Q100-25 = 8.6 CFS, Pro-rated Area = 5.0 Ac (Tc)100 = 25.12, Fm = 0.582
450-1	450-1	1						2 1/2
450-1	452-1	3	1273 / 1266	1500				
452	452-1	8					38.8	
~~452.1~~	~~453-1~~	~~3~~	1266 / 1251	980				
~~453~~	~~453-1~~	~~8~~					10 A	
452-1	452-1	1						1 1/2
452-1	452-1	7						Pond 452 Q100-25 = 19.6 CFS, Pro-rated Area = 12.2 A (Tc)100 = 27.11, Fm = 0.582
452-1	452-1	1						2 1/2
452-1	453-1	3	1266 / 1251	980				
453	453-1	8					10 Ac	
453-1	456-1	3	1251 / 1229	1650				
456	456-1	8					24 Ac	
457	456-1	8					2.6	
456-1	456-1	1						

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        Copyright 1983,86,87 Advanced Engineering Software (aes)
           Ver. 4.1C  Release Date: 5/11/87  Serial # I00908

                        Especially prepared for:

                        25 yr HALL & FOREMAN
************************** DESCRIPTION OF STUDY **************************
* W. FONTANA LINE T-6 FOR   --YR. STORM.                                 *
* DESIGN Q FOR W. FONTANA CHANNEL ONLY.                                  *
* JN 3547, T. ARROYO, 11/28/89.                                          *
**************************************************************************

 FILE NAME: A:WFONT6R.DES
 TIME/DATE OF STUDY:  9:59  11/27/1989
==========================================================================
 USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

 USER SPECIFIED STORM EVENT(YEAR) =   25.00
 SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
 SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =  .95
 *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
 10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =   .970
 100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
  )MPUTED RAINFALL INTENSITY DATA:
 STORM EVENT =   25.00   1-HOUR INTENSITY(INCH/HOUR) = 1.1461
 SLOPE OF INTENSITY DURATION CURVE =  .6000


**************************************************************************
 FLOW PROCESS FROM NODE   454.00 TO NODE   454.10 IS CODE =   2
--------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
 DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH =  1000.00
 UPSTREAM ELEVATION =   1266.00
 DOWNSTREAM ELEVATION =   1249.00
 ELEVATION DIFFERENCE =     17.00
 TC =  .412*[( 1000.00** 3.00)/(    17.00)]** .20 =   14.751
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.660
 SOIL CLASSIFICATION IS "A"
```

```
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
SUBAREA RUNOFF(CFS) =     18.70
TOTAL AREA(ACRES) =     10.00   PEAK FLOW RATE(CFS) =     18.70

 ****************************************************************************
 LOW PROCESS FROM NODE   454.10 TO NODE   455.21 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
UPSTREAM ELEVATION =   1249.00   DOWNSTREAM ELEVATION =   1247.30
STREET LENGTH(FEET) =   350.00   CURB HEIGTH(INCHES) = 8.
STREET HALFWIDTH(FEET) = 36.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  24.00
INTERIOR STREET CROSSFALL(DECIMAL) =   .020
OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   18.70
  STREETFLOW MODEL RESULTS:
      STREET FLOWDEPTH(FEET) =   .64
      HALFSTREET FLOODWIDTH(FEET) =   13.88
      AVERAGE FLOW VELOCITY(FEET/SEC.) =   2.66
      PRODUCT OF DEPTH&VELOCITY =   1.69
STREETFLOW TRAVELTIME(MIN) =  2.19   TC(MIN) =  16.94

  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.447
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
EFFECTIVE AREA(ACRES) =   10.00
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =   10.00   PEAK FLOW RATE(CFS) =     18.70
END OF SUBAREA STREETFLOW HYDRAULICS:
DEPTH(FEET) =  .64   HALFSTREET FLOODWIDTH(FEET) = 13.88
FLOW VELOCITY(FEET/SEC.) =  2.66   DEPTH*VELOCITY =   1.69

****************************************************************************
FLOW PROCESS FROM NODE   455.00 TO NODE   455.21 IS CODE =   8
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.447
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
SUBAREA AREA(ACRES) =   10.00   SUBAREA RUNOFF(CFS) =   16.79
EFFECTIVE AREA(ACRES) =   20.00
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =   20.00
PEAK FLOW RATE(CFS) =   33.58
TC(MIN) =  16.94

****************************************************************************
FLOW PROCESS FROM NODE   455.21 TO NODE   456.01 IS CODE =   3
----------------------------------------------------------------------------
>>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.7 INCHES
PIPEFLOW VELOCITY(FEET/SEC.) =   6.5
UPSTREAM NODE ELEVATION =  1247.30
DOWNSTREAM NODE ELEVATION =  1245.00
```

```
 FLOWLENGTH(FEET) =   575.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =     33.58
 TRAVEL TIME(MIN.) =   1.48    TC(MIN.) =  18.42

 ****************************************************************************
 FLOW PROCESS FROM NODE   456.00 TO NODE   456.01 IS CODE =   8
 ----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 ============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.328
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   31.42
 EFFECTIVE AREA(ACRES) =   40.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   40.00
 PEAK FLOW RATE(CFS) =   62.85
 TC(MIN) =  18.42

 ****************************************************************************
 FLOW PROCESS FROM NODE   456.01 TO NODE   457.01 IS CODE =   3
 ----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 ============================================================================
 DEPTH OF FLOW IN  45.0 INCH PIPE IS  33.4 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   7.1
 UPSTREAM NODE ELEVATION =  1245.00
 DOWNSTREAM NODE ELEVATION =  1242.80
 FLOWLENGTH(FEET) =   630.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =     62.85
 TRAVEL TIME(MIN.) =   1.47    TC(MIN.) =  19.89

 ****************************************************************************
 FLOW PROCESS FROM NODE   457.00 TO NODE   457.01 IS CODE =   8
 ----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
 ============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.223
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   28.00   SUBAREA RUNOFF(CFS) =   41.35
 EFFECTIVE AREA(ACRES) =   68.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   68.00
 PEAK FLOW RATE(CFS) =  100.42
 TC(MIN) =  19.89

 ****************************************************************************
 FLOW PROCESS FROM NODE   457.01 TO NODE   455.10 IS CODE =   3
 ----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 ============================================================================
 DEPTH OF FLOW IN  51.0 INCH PIPE IS  36.4 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   9.3
 UPSTREAM NODE ELEVATION =  1242.80
 DOWNSTREAM NODE ELEVATION =  1239.00
 FLOWLENGTH(FEET) =   750.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
```

```
PIPEFLOW THRU SUBAREA(CFS) =    100.42
TRAVEL TIME(MIN.) =   1.35    TC(MIN.) =  21.24

****************************************************************************
 FLOW PROCESS FROM NODE   457.10 TO NODE   455.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.137
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   55.99
 EFFECTIVE AREA(ACRES) =  108.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  108.00
 PEAK FLOW RATE(CFS) =  151.17
 TC(MIN) =  21.24

****************************************************************************
 FLOW PROCESS FROM NODE   455.10 TO NODE   458.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  51.0 INCH PIPE IS  39.0 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  13.0
 UPSTREAM NODE ELEVATION =  1239.00
 DOWNSTREAM NODE ELEVATION =  1223.00
 FLOWLENGTH(FEET) =  1650.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   151.17
 TRAVEL TIME(MIN.) =   2.12    TC(MIN.) =  23.36

****************************************************************************
 FLOW PROCESS FROM NODE   458.00 TO NODE   458.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.019
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   78.00   SUBAREA RUNOFF(CFS) =  100.86
 EFFECTIVE AREA(ACRES) =  186.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  186.00
 PEAK FLOW RATE(CFS) =  240.50
 TC(MIN) =  23.36

****************************************************************************
 FLOW PROCESS FROM NODE   458.10 TO NODE   458.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  23.36
 RAINFALL INTENSITY (INCH./HOUR) =   2.02
 EFFECTIVE STREAM AREA(ACRES) =  186.00
 TOTAL STREAM AREA(ACRES) =  186.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    240.50
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =    186.00
```

```
 EFFECTIVE AREA(ACRES) =    186.00
 PEAK FLOW RATE(CFS)   =    240.50
 ================================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
                          HALL & FOREMAN
************************** DESCRIPTION OF STUDY **************************
* W. FONTANA LINE T6 (REVISED) FOR 100-YR. STORM.                        *
* LINE ALONG ARROW RT. TO LIME AVE., TO W. FONTANA CHANNEL. (NOT DESIGN Q) *
*  OT DESIGN Q.  T. ARROYO, 9/29/89.                                     *
**************************************************************************

 FILE NAME: WFONT6R.100
 TIME/DATE OF STUDY: 12:43   9/29/1989
==========================================================================
 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 =  .95
 *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
 10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =   .970
 100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
 COMPUTED RAINFALL INTENSITY DATA:
 STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) = 1.4700
 SLOPE OF INTENSITY DURATION CURVE =  .6000


**************************************************************************
 FLOW PROCESS FROM NODE   454.00 TO NODE   454.10 IS CODE =   2
--------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 ==========================================================================
 DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH =  1000.00
 UPSTREAM ELEVATION =   1266.00
 DOWNSTREAM ELEVATION =   1249.00
 ELEVATION DIFFERENCE =     17.00
 TC =  .412*[( 1000.00** 3.00)/(    17.00)]** .20 =   14.751
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.411
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA RUNOFF(CFS) =     25.46
 TOTAL AREA(ACRES) =     10.00   PEAK FLOW RATE(CFS) =     25.46


**************************************************************************
 FLOW PROCESS FROM NODE   454.10 TO NODE   455.21 IS CODE =   6
--------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
 UPSTREAM ELEVATION =   1249.00   DOWNSTREAM ELEVATION =   1247.30
 STREET LENGTH(FEET) =   350.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 36.00

  ISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  24.00
 _NTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
```

```
        THAT NEGLIBLE FLOW OCCURS OUTSIDE OF THE STREET CHANNEL.
        THAT IS, ALL FLOW ALONG THE PARKWAY, ETC., IS NEGLECTED.
        STREET FLOWDEPTH(FEET) =    .71
        HALFSTREET FLOODWIDTH(FEET) =   17.62
        AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.71
        PRODUCT OF DEPTH&VELOCITY =    1.93
STREETFLOW TRAVELTIME(MIN) =   2.15   TC(MIN) =  16.90

 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.144
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
EFFECTIVE AREA(ACRES) =   10.00
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =   10.00   PEAK FLOW RATE(CFS) =     25.46
END OF SUBAREA STREETFLOW HYDRAULICS:
DEPTH(FEET) =  .71   HALFSTREET FLOODWIDTH(FEET) = 17.62
FLOW VELOCITY(FEET/SEC.) =  2.71   DEPTH*VELOCITY =   1.93


****************************************************************************
FLOW PROCESS FROM NODE   455.00 TO NODE   455.21 IS CODE =   8
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.144
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
SUBAREA AREA(ACRES) =   10.00   SUBAREA RUNOFF(CFS) =   23.06
EFFECTIVE AREA(ACRES) =   20.00
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =   20.00
PEAK FLOW RATE(CFS) =   46.11
TC(MIN) =  16.90

****************************************************************************
FLOW PROCESS FROM NODE   455.21 TO NODE   456.01 IS CODE =   3
----------------------------------------------------------------------------
>>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
DEPTH OF FLOW IN  39.0 INCH PIPE IS  29.1 INCHES
PIPEFLOW VELOCITY(FEET/SEC.) =   6.9
UPSTREAM NODE ELEVATION =  1247.30
DOWNSTREAM NODE ELEVATION =  1245.00
FLOWLENGTH(FEET) =   575.00   MANNINGS N =  .013
ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
PIPEFLOW THRU SUBAREA(CFS) =     46.11
TRAVEL TIME(MIN.) =   1.38    TC(MIN.) =  18.28


****************************************************************************
FLOW PROCESS FROM NODE   456.00 TO NODE   456.01 IS CODE =   8
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.999
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   43.51
EFFECTIVE AREA(ACRES) =   40.00
```

```
****************************************************************************
 FLOW PROCESS FROM NODE   456.01 TO NODE   457.01 IS CODE =   3
----------------------------------------------------------------------------
 >>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  51.0 INCH PIPE IS  37.6 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   7.8
 UPSTREAM NODE ELEVATION =  1245.00
 DOWNSTREAM NODE ELEVATION =  1242.80
 FLOWLENGTH(FEET) =   630.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    87.02
 TRAVEL TIME(MIN.) =   1.35    TC(MIN.) =  19.64

****************************************************************************
 FLOW PROCESS FROM NODE   457.00 TO NODE   457.01 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.873
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   28.00   SUBAREA RUNOFF(CFS) =   57.74
 EFFECTIVE AREA(ACRES) =   68.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   68.00
 PEAK FLOW RATE(CFS) =  140.23
  C(MIN) =  19.64

****************************************************************************
 FLOW PROCESS FROM NODE   457.01 TO NODE   455.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  41.9 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  10.0
 UPSTREAM NODE ELEVATION =  1242.80
 DOWNSTREAM NODE ELEVATION =  1239.00
 FLOWLENGTH(FEET) =   750.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   140.23
 TRAVEL TIME(MIN.) =   1.24    TC(MIN.) =  20.88

****************************************************************************
 FLOW PROCESS FROM NODE   457.10 TO NODE   455.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.769
  OIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   78.74
 EFFECTIVE AREA(ACRES) =  108.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  108.00
```

```
**************************************************************************
 FLOW PROCESS FROM NODE   455.10 TO NODE   458.10 IS CODE =   3
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
 ==========================================================================
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  45.5 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  14.0
 UPSTREAM NODE ELEVATION =  1239.00
 DOWNSTREAM NODE ELEVATION =  1223.00
 FLOWLENGTH(FEET) =  1650.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   212.61
 TRAVEL TIME(MIN.) =   1.96    TC(MIN.) =  22.84

**************************************************************************
 FLOW PROCESS FROM NODE   458.00 TO NODE   458.10 IS CODE =   8
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.624
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   78.00   SUBAREA RUNOFF(CFS) =  143.36
 EFFECTIVE AREA(ACRES) =  186.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  186.00
 PEAK FLOW RATE(CFS) =  341.85
 TC(MIN) =  22.84

**************************************************************************
 FLOW PROCESS FROM NODE   458.10 TO NODE   458.10 IS CODE =   1
--------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  22.84
 RAINFALL INTENSITY (INCH./HOUR) =   2.62
 EFFECTIVE STREAM AREA(ACRES) =  186.00
 TOTAL STREAM AREA(ACRES) =  186.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =   341.85
==========================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =    186.00
 EFFECTIVE AREA(ACRES) =    186.00
 PEAK FLOW RATE(CFS)    =    341.85
==========================================================================
 END OF RATIONAL METHOD ANALYSIS
```

DATA FOR W. FONTANA CHANNEL

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**********************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        Copyright 1983,86,87 Advanced Engineering Software (aes)
           Ver. 4.1C  Release Date: 5/11/87  Serial # I00908

                        Especially prepared for:

                          HALL & FOREMAN
************************** DESCRIPTION OF STUDY **************************
 W. FONTANA LINE T6 (REVISED) FOR 25-YR. STORM.                           *
 LINE ALONG ARROW RT. TO LIME AVE., TO W. FONTANA CHANNEL.                *
 DESIGN Q.  T. ARROYO, 9/29/89                                            *
**********************************************************************

 FILE NAME: WFONT6R.025
 TIME/DATE OF STUDY: 12:41   9/29/1989
======================================================================
 USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
======================================================================
                  --*TIME-OF-CONCENTRATION MODEL*--

 USER SPECIFIED STORM EVENT(YEAR) =   25.00
 SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
 SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =  .95
 *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
 10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =   .970
 100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
  COMPUTED RAINFALL INTENSITY DATA:
 STORM EVENT =   25.00   1-HOUR INTENSITY(INCH/HOUR) = 1.1461
 SLOPE OF INTENSITY DURATION CURVE =  .6000


**********************************************************************
 FLOW PROCESS FROM NODE   454.00 TO NODE   454.10 IS CODE =   2
----------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
======================================================================
 DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH =  1000.00
 UPSTREAM ELEVATION =   1266.00
 DOWNSTREAM ELEVATION =   1249.00
 ELEVATION DIFFERENCE =     17.00
 TC =  .412*[( 1000.00** 3.00)/(    17.00)]** .20 =   14.751
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.660
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA RUNOFF(CFS) =     18.70
 TOTAL AREA(ACRES) =     10.00   PEAK FLOW RATE(CFS) =     18.70


 **********************************************************************
 FLOW PROCESS FROM NODE   454.10 TO NODE   455.21 IS CODE =   6
----------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
======================================================================
```

```
 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  24.00
 INTERIOR STREET CROSSFALL(DECIMAL) =    .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =    .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   18.70
   STREETFLOW MODEL RESULTS:
      STREET FLOWDEPTH(FEET) =   .64
      HALFSTREET FLOODWIDTH(FEET) =   13.88
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.66
      PRODUCT OF DEPTH&VELOCITY =    1.69
 STREETFLOW TRAVELTIME(MIN) =   2.19   TC(MIN) =  16.94

   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.447
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   10.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   10.00   PEAK FLOW RATE(CFS) =     18.70
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .64   HALFSTREET FLOODWIDTH(FEET) = 13.88
 FLOW VELOCITY(FEET/SEC.) =  2.66   DEPTH*VELOCITY =   1.69

****************************************************************************
 FLOW PROCESS FROM NODE   455.00 TO NODE   455.21 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.447
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   10.00   SUBAREA RUNOFF(CFS) =   16.79
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   20.00
 PEAK FLOW RATE(CFS) =   33.58
 TC(MIN) =  16.94

****************************************************************************
 FLOW PROCESS FROM NODE   455.21 TO NODE   456.01 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.7 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   6.5
 UPSTREAM NODE ELEVATION =  1247.30
 DOWNSTREAM NODE ELEVATION =  1245.00
 FLOWLENGTH(FEET) =   575.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =     33.58
 TRAVEL TIME(MIN.) =   1.48    TC(MIN.) =  18.42

****************************************************************************
 FLOW PROCESS FROM NODE   456.00 TO NODE   456.01 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   31.42
 EFFECTIVE AREA(ACRES) =   40.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   40.00
 PEAK FLOW RATE(CFS) =   62.85
 TC(MIN) =  18.42


****************************************************************************
 FLOW PROCESS FROM NODE   456.01 TO NODE   457.01 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  45.0 INCH PIPE IS  33.4 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   7.1
 UPSTREAM NODE ELEVATION =  1245.00
 DOWNSTREAM NODE ELEVATION =  1242.80
 FLOWLENGTH(FEET) =   630.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    62.85
 TRAVEL TIME(MIN.) =   1.47    TC(MIN.) =  19.89


****************************************************************************
 FLOW PROCESS FROM NODE   457.00 TO NODE   457.01 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.223
 SOIL CLASSIFICATION IS "A"
  ESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 ,UBAREA AREA(ACRES) =   28.00   SUBAREA RUNOFF(CFS) =   41.35
 EFFECTIVE AREA(ACRES) =   68.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   68.00
 PEAK FLOW RATE(CFS) =  100.42
 TC(MIN) =  19.89


****************************************************************************
 FLOW PROCESS FROM NODE   457.01 TO NODE   455.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  51.0 INCH PIPE IS  36.4 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   9.3
 UPSTREAM NODE ELEVATION =  1242.80
 DOWNSTREAM NODE ELEVATION =  1239.00
 FLOWLENGTH(FEET) =   750.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   100.42
 TRAVEL TIME(MIN.) =   1.35    TC(MIN.) =  21.24


****************************************************************************
 LOW PROCESS FROM NODE   457.10 TO NODE   455.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.137
```

```
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =  108.00
PEAK FLOW RATE(CFS) =  151.17
TC(MIN) =  21.24


****************************************************************************
FLOW PROCESS FROM NODE   455.10 TO NODE   458.10 IS CODE =   3
----------------------------------------------------------------------------
>>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
DEPTH OF FLOW IN  51.0 INCH PIPE IS  39.0 INCHES
PIPEFLOW VELOCITY(FEET/SEC.) =  13.0
UPSTREAM NODE ELEVATION =  1239.00
DOWNSTREAM NODE ELEVATION =  1223.00
FLOWLENGTH(FEET) =  1650.00   MANNINGS N =  .013
ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
PIPEFLOW THRU SUBAREA(CFS) =   151.17
TRAVEL TIME(MIN.) =   2.12    TC(MIN.) =  23.36


****************************************************************************
FLOW PROCESS FROM NODE   458.00 TO NODE   458.10 IS CODE =   8
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.019
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR)  .5820
SUBAREA AREA(ACRES) =   78.00   SUBAREA RUNOFF(CFS) =  100.86
 FFECTIVE AREA(ACRES) =  186.00
.VERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =  186.00
PEAK FLOW RATE(CFS) =  240.50
TC(MIN) =  23.36


****************************************************************************
FLOW PROCESS FROM NODE   458.10 TO NODE   458.10 IS CODE =  1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MINUTES) =  23.36
RAINFALL INTENSITY (INCH./HOUR) =   2.02
EFFECTIVE STREAM AREA(ACRES) =  186.00
TOTAL STREAM AREA(ACRES) =  186.00
PEAK FLOW RATE(CFS) AT CONFLUENCE =   240.50
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)      =    186.00
EFFECTIVE AREA(ACRES) =    186.00
PEAK FLOW RATE(CFS)   =    240.50
============================================================================
END OF RATIONAL METHOD ANALYSIS


****************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
```

PROJECT: T6 (REVISED) COUNTY

STORM FREQUENCY: JOB NO.

BL. ARA DESIGNATION	NODAL REACH	FLOW CODE	UPPER-LOWER ELEVATIONS	TRAVEL LENGTH	LAND USE	SOIL GROUP	AREA	NOTES AND/OR DATA
454	454.1	2	1266 / 1249	1000	8	A	10	i_{10} = 0.95 i_{100} = 1.40
454.1	455.21	6	1249 / 1247.3	350				½ width = 36' slope: .020 → .0 Crown to X-fall = 24' (ARROW RT.)
455	455.21	8			8	A	10	
455.21	456.01	3	~~1247.3~~ ~~1244.4~~ / 1245.0	575				n = 0.013
456	456.01	8			8	A	20	
456.01	457.01	3	1245.0 / 1242.8	630				n = 0.013
457.0	457.01	8			8	A	28	
457.01	455.1	3	1242.8 / 1239	750				n = 0.013
457.10	455.1	8			8	A	40	
455.1	458.1	3	1239 / 1223	1650				n = 0.013
458	458.1	8			8	A	78	
458.1	458.1	1						1 OF 2

RATIONAL METHOD USING AESSOFT

PROJECT: T6 COUNTY

WIDONLAT6.DES.

STORM FREQUENCY: JOB NO.

SUBAREA DESIGNATION	NODAL REACH	FLOW CODE	UPPER-LOWER ELEVATIONS	TRAVEL LENGTH	LAND USE	SOIL GROUP	AREA	NOTES AND/OR DATA
133	133.01	2	1385 / 1362	1080			7.5	
133.01	134.01	5	1362 / 1344	1050				
134	134.01	8					7.5	
134.01	134.1	5	1344 / 1332	670				
133.12	134.1	8					5	
134.1	135.1	5	1332 / 1330	320				
135	135.1	8					20 Ac	
135.1	136.1	3	1330 / 1325.5	720				
136	136.1	8					40	
136.1	136.1	1						102
221.3	221.3	7						Q = 52 CFS, Area = 31 Ac, Em = 1.60. From Basin Cen flow flow SEE: [illegible] D'
221.3 / 136.1	136.1 / 136.1	6 / 1	[illegible]	[illegible]				[illegible]
136.1	130.1	3	1325.5 / 1280	2750				
130.1	130.1	1						102
130	130.01	2	1334 / 1313	1000			7.5	
130.01	130.02	5	1313 / 1297	1000			—	
130.1	130.02	8					7.5	
130.02	130.02	5	1297 / [illegible]	[illegible]				

RATIONAL METHOD USING AESSOFT

PROJECT: T6 _____ COUNTY

_____ STORM FREQUENCY: _____ JOB NO. _____

SUB-AREA DESIGNATION	NODAL REACH	FLOW CODE	UPPER-LOWER ELEVATIONS	TRAVEL LENGTH	LAND USE	SOIL GROUP	AREA	NOTES AND/OR DATA
130-2	130-22	8					5 Ac	
130-12	130-22	6	1285 / 1283	330				
130-21	130-22	8					2 Ac	
130-22	130-1	3	1283 / 1280	680				
130-31	130-1	8					40 IC	
130-1	130-1	1						2 of 2
130-1	130-1	1						1 of 2
130-1	130-1	7	$Q_{100-2yr}$ = Pre-water	44.7 Ac, Area = 24.7,	T_c 100	= 23.0		In 50 Ac, Area No. 130, Q_{100} = 5.0 Sec 100 YR & 2 YR Calcs
130-1	130-1	1						2 of 2
130-1	455-1	3	1280 / 1239	265				
455-1	455-1	1						1 of 2
454	454-1	2	1266 / 1249	105			10 Ac	
454-1	455-2	6	1249 / 1246	600				
455	455-2	8					20 Ac	
455-2	456-1	6	1246 / 1243	600				
456	456-1	8					23	
456-1	455-1	3	1243 / 1239	1100				
457	455-1	8					51	

RATIONAL METHOD USING AESSOFT

PROJECT: T6 COUNTY

STORM FREQUENCY: JOB NO.

SUB-AREA DESIGNATION	NODAL REACH	FLOW CODE	UPPER-LOWER ELEVATIONS	TRAVEL LENGTH	LAND USE	SOIL GROUP	AREA	NOTES AND/OR DATA
455.1	458.1	3	1239 / 1223	1650				
458	458.1	8					78	
458.1	458.1	1						

```
**********************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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          Ver. 4.1C  Release Date: 5/11/87  Serial # I00908

                        Especially prepared for:

                            HALL & FOREMAN
 ************************** DESCRIPTION OF STUDY **********************
* N. FONTANA MASTER S.D. PLAN, W. FONTANA CHANNEL LAT. 7
* Q 100-25 YEAR, DESIGN Q FOR NORTHERN PORTION OF LAT. T-7
* JN 3547
 **********************************************************************

  FILE NAME: WFONT7RA.DES
  TIME/DATE OF STUDY:  2:30   1/ 1/1980
======================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
======================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =   .970
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   25.00   1-HOUR INTENSITY(INCH/HOUR) = 1.1461
  SLOPE OF INTENSITY DURATION CURVE =  .6000


**********************************************************************
  FLOW PROCESS FROM NODE   133.00 TO NODE   133.01 IS CODE =   2
----------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
======================================================================
  DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

  TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
  INITIAL SUBAREA FLOW-LENGTH =  1000.00
  UPSTREAM ELEVATION =   1385.00
  DOWNSTREAM ELEVATION =   1362.00
  ELEVATION DIFFERENCE =     23.00
  TC =  .412*[( 1000.00** 3.00)/(    23.00)]** .20 =   13.885
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.758
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA RUNOFF(CFS) =     14.69
  TOTAL AREA(ACRES) =      7.50   PEAK FLOW RATE(CFS) =     14.69
```

```
****************************************************************************
 FLOW PROCESS FROM NODE   133.01 TO NODE   134.01 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1362.00
 DOWNSTREAM NODE ELEVATION =   1344.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     14.69
 FLOW VELOCITY(FEET/SEC) =   4.48   FLOW DEPTH(FEET) =    .73
 TRAVEL TIME(MIN.) =   3.72   TC(MIN.) =  17.61


****************************************************************************
 FLOW PROCESS FROM NODE   134.00 TO NODE   134.01 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.392
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =    7.50   SUBAREA RUNOFF(CFS) =   12.21
 EFFECTIVE AREA(ACRES) =   15.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   15.00
 PEAK FLOW RATE(CFS) =   24.43
 TC(MIN) =  17.61


****************************************************************************
 FLOW PROCESS FROM NODE   134.01 TO NODE   134.10 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1344.00
 DOWNSTREAM NODE ELEVATION =   1332.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   670.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     24.43
 FLOW VELOCITY(FEET/SEC) =   4.99   FLOW DEPTH(FEET) =    .98
 TRAVEL TIME(MIN.) =   2.24   TC(MIN.) =  19.84


****************************************************************************
 FLOW PROCESS FROM NODE   133.12 TO NODE   134.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.226
 SOIL CLASSIFICATION IS "A"
```

```
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     5.00   SUBAREA RUNOFF(CFS) =     7.40
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =    20.00
 PEAK FLOW RATE(CFS) =    29.59
 TC(MIN) =  19.84


****************************************************************************
 FLOW PROCESS FROM NODE    134.10 TO NODE    135.10 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =    1332.00   DOWNSTREAM ELEVATION =    1330.00
 STREET LENGTH(FEET) =    320.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
 INTERIOR STREET CROSSFALL(DECIMAL) =    .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =    .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

       **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =    29.59
 ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS:
       NOTE: STREETFLOW EXCEEDS TOP OF CURB.
       THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =    .69
       HALFSTREET FLOODWIDTH(FEET) =   20.00
       AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.97
       PRODUCT OF DEPTH&VELOCITY =    2.04
 STREETFLOW TRAVELTIME(MIN) =   1.80   TC(MIN) =  21.64

   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.113
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =      .00   SUBAREA RUNOFF(CFS) =      .00
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =   20.00   PEAK FLOW RATE(CFS) =     29.59
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .69   HALFSTREET FLOODWIDTH(FEET) = 20.00
 FLOW VELOCITY(FEET/SEC.) =  2.97   DEPTH*VELOCITY =   2.04


****************************************************************************
 FLOW PROCESS FROM NODE    135.00 TO NODE    135.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.113
```

```
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   27.56
  EFFECTIVE AREA(ACRES) =   40.00
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =   40.00
  PEAK FLOW RATE(CFS) =   55.12
  TC(MIN) =  21.64


****************************************************************************
  FLOW PROCESS FROM NODE   135.10 TO NODE   135.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MINUTES) =  21.64
  RAINFALL INTENSITY (INCH./HOUR) =   2.11
  EFFECTIVE STREAM AREA(ACRES) =   40.00
  TOTAL STREAM AREA(ACRES) =   40.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     55.12


****************************************************************************
  FLOW PROCESS FROM NODE   221.10 TO NODE   221.10 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  18.60   RAIN INTENSITY(INCH/HOUR) =  2.31
  EFFECTIVE AREA(ACRES) =    19.70
  TOTAL AREA(ACRES) =    19.70   PEAK FLOW RATE(CFS) =     44.10
  AVERAGED LOSS RATE, Fm(IN/HR) =   .582


****************************************************************************
  FLOW PROCESS FROM NODE   221.10 TO NODE   135.10 IS CODE =   6
----------------------------------------------------------------------------
  >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM ELEVATION =   1380.00   DOWNSTREAM ELEVATION =   1330.00
  STREET LENGTH(FEET) =  2600.00   CURB HEIGTH(INCHES) = 8.
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
  INTERIOR STREET CROSSFALL(DECIMAL) =   .020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

       **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   44.10
    STREETFLOW MODEL RESULTS:
       STREET FLOWDEPTH(FEET) =   .66
       HALFSTREET FLOODWIDTH(FEET) =   18.87
       AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.07
```

```
        PRODUCT OF DEPTH&VELOCITY =     3.32
  STREETFLOW TRAVELTIME(MIN) =   8.55   TC(MIN) =  27.15

    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.844
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
  EFFECTIVE AREA(ACRES) =   19.70
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =   19.70   PEAK FLOW RATE(CFS) =     44.10
  END OF SUBAREA STREETFLOW HYDRAULICS:
  DEPTH(FEET) =  .66   HALFSTREET FLOODWIDTH(FEET) = 18.87
  FLOW VELOCITY(FEET/SEC.) =  5.07   DEPTH*VELOCITY =   3.32


****************************************************************************
  FLOW PROCESS FROM NODE   135.10 TO NODE   135.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MINUTES) =  27.15
  RAINFALL INTENSITY (INCH./HOUR) =   1.84
  EFFECTIVE STREAM AREA(ACRES) =   19.70
  TOTAL STREAM AREA(ACRES) =   19.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     44.10

  CONFLUENCE INFORMATION:
  STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
  NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
----------------------------------------------------------------------
    1       55.12     21.64       2.113     .58       40.00
    2       44.10     27.15       1.844     .58       19.70

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.
  SUMMARY RESULTS:
  STREAM   CONFLUENCE   EFFECTIVE
  NUMBER     Q(CFS)    AREA(ACRES)
-----------------------------------------
    1       97.76        55.70
    2       89.54        59.70
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     97.76   TIME(MINUTES) =   21.642
  EFFECTIVE AREA(ACRES) =     55.70
  TOTAL AREA(ACRES) =     59.70


****************************************************************************
  FLOW PROCESS FROM NODE   135.10 TO NODE   136.10 IS CODE =   3
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  35.1 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   9.9
 UPSTREAM NODE ELEVATION =  1330.00
 DOWNSTREAM NODE ELEVATION =  1325.50
 FLOWLENGTH(FEET) =   720.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =     97.76
 TRAVEL TIME(MIN.) =   1.21    TC(MIN.) =  22.85

****************************************************************************
 FLOW PROCESS FROM NODE   136.00 TO NODE   136.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.046
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   52.69
 EFFECTIVE AREA(ACRES) =   95.70
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   99.70
 PEAK FLOW RATE(CFS) =  126.06
 TC(MIN) =  22.85

****************************************************************************
 FLOW PROCESS FROM NODE   136.10 TO NODE   130.10 IS CODE =   4
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  29.6 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  15.5
 UPSTREAM NODE ELEVATION =  1325.50
 DOWNSTREAM NODE ELEVATION =  1280.00
 FLOWLENGTH(FEET) =  2750.00   MANNINGS N =  .013
 GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    126.06
 TRAVEL TIME(MIN.) =   2.96    TC(MIN.) =  25.80

****************************************************************************
 FLOW PROCESS FROM NODE   130.10 TO NODE   130.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  25.80
 RAINFALL INTENSITY (INCH./HOUR) =   1.90
 EFFECTIVE STREAM AREA(ACRES) =   95.70
 TOTAL STREAM AREA(ACRES) =   99.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    126.06
```

```
  CONFLUENCE INFORMATION:
  STREAM    PEAK FLOW    TIME    INTENSITY     FM     EFFECTIVE
  NUMBER    RATE(CFS)   (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
-------------------------------------------------------------------
    1       126.06      25.80       1.902      .58       95.70

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  1 STREAMS.
  SUMMARY RESULTS:
  STREAM    CONFLUENCE    EFFECTIVE
  NUMBER      Q(CFS)     AREA(ACRES)
-----------------------------------------------
    1       126.06         95.70
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    126.06   TIME(MINUTES) =   25.804
  EFFECTIVE AREA(ACRES) =     95.70
  TOTAL AREA(ACRES) =      99.70
===================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =     99.70
  EFFECTIVE AREA(ACRES) =     95.70
  PEAK FLOW RATE(CFS)    =    126.06
===================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        Copyright 1983,86,87 Advanced Engineering Software (aes)
           Ver. 4.1C  Release Date: 5/11/87  Serial # I00908

                          Especially prepared for:

                              HALL & FOREMAN
 ************************** DESCRIPTION OF STUDY **********************
* N. FONTANA MASTER S.D. PLAN, W. FONTANA CHANNEL LAT. 7
* Q 100-25 YEAR, DESIGN Q FOR SOUTHERN PORTION OF LAT. T-7
* JN 3547
 **************************************************************************

  FILE NAME: WFONT7RB.DES
  TIME/DATE OF STUDY:  2:36   1/ 1/1980
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =   .970
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   25.00   1-HOUR INTENSITY(INCH/HOUR) = 1.1461
  SLOPE OF INTENSITY DURATION CURVE =  .6000


**************************************************************************
  FLOW PROCESS FROM NODE   130.00 TO NODE   130.01 IS CODE =   2
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

  TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
  INITIAL SUBAREA FLOW-LENGTH =  1000.00
  UPSTREAM ELEVATION =   1334.00
  DOWNSTREAM ELEVATION =   1313.00
  ELEVATION DIFFERENCE =     21.00
  TC =  .412*[( 1000.00** 3.00)/(    21.00)]** .20 =   14.140
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.728
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA RUNOFF(CFS) =     14.49
  TOTAL AREA(ACRES) =      7.50   PEAK FLOW RATE(CFS) =     14.49
```

```
****************************************************************************
 FLOW PROCESS FROM NODE   130.01 TO NODE   130.02 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1313.00
 DOWNSTREAM NODE ELEVATION =   1297.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     14.49
 FLOW VELOCITY(FEET/SEC) =   4.18   FLOW DEPTH(FEET) =    .77
 TRAVEL TIME(MIN.) =   3.99   TC(MIN.) =  18.13


****************************************************************************
 FLOW PROCESS FROM NODE   130.10 TO NODE   130.02 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.350
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =    7.50   SUBAREA RUNOFF(CFS) =   11.93
 EFFECTIVE AREA(ACRES) =   15.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   15.00
 PEAK FLOW RATE(CFS) =   23.87
 TC(MIN) =  18.13


****************************************************************************
 FLOW PROCESS FROM NODE   130.02 TO NODE   130.12 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1297.00
 DOWNSTREAM NODE ELEVATION =   1285.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   720.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     23.87
 FLOW VELOCITY(FEET/SEC) =   4.88   FLOW DEPTH(FEET) =    .98
 TRAVEL TIME(MIN.) =   2.46   TC(MIN.) =  20.59


****************************************************************************
 FLOW PROCESS FROM NODE   130.20 TO NODE   130.12 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.177
 SOIL CLASSIFICATION IS "A"
```

```
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     5.00   SUBAREA RUNOFF(CFS) =     7.18
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =   20.00
 PEAK FLOW RATE(CFS) =   28.72
 TC(MIN) =  20.59


****************************************************************************
 FLOW PROCESS FROM NODE   130.12 TO NODE   130.22 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1285.00   DOWNSTREAM ELEVATION =   1283.00
 STREET LENGTH(FEET) =   320.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 32.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  24.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   28.72
   STREETFLOW MODEL RESULTS:
      NOTE: STREETFLOW EXCEEDS TOP OF CURB.
      THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .69
      HALFSTREET FLOODWIDTH(FEET) =   20.37
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.91
      PRODUCT OF DEPTH&VELOCITY =    1.99
 STREETFLOW TRAVELTIME(MIN) =   1.84   TC(MIN) =  22.43

   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.069
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =      .00   SUBAREA RUNOFF(CFS) =      .00
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =   20.00   PEAK FLOW RATE(CFS) =     28.72
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .69   HALFSTREET FLOODWIDTH(FEET) = 20.37
 FLOW VELOCITY(FEET/SEC.) =  2.91   DEPTH*VELOCITY =   1.99


****************************************************************************
 FLOW PROCESS FROM NODE   130.21 TO NODE   130.22 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.069
 SOIL CLASSIFICATION IS "A"
```

```
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   26.76
 EFFECTIVE AREA(ACRES) =   40.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   40.00
 PEAK FLOW RATE(CFS) =   53.52
 TC(MIN) =  22.43

****************************************************************************
 FLOW PROCESS FROM NODE   130.22 TO NODE   130.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.0 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   7.6
 UPSTREAM NODE ELEVATION =  1283.00
 DOWNSTREAM NODE ELEVATION =  1280.00
 FLOWLENGTH(FEET) =   680.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    53.52
 TRAVEL TIME(MIN.) =   1.50    TC(MIN.) =  23.93

****************************************************************************
 FLOW PROCESS FROM NODE   130.31 TO NODE   130.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.990
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   50.68
 EFFECTIVE AREA(ACRES) =   80.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   80.00
 PEAK FLOW RATE(CFS) =  101.36
 TC(MIN) =  23.93

****************************************************************************
 FLOW PROCESS FROM NODE   130.10 TO NODE   130.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  23.93
 RAINFALL INTENSITY (INCH./HOUR) =   1.99
 EFFECTIVE STREAM AREA(ACRES) =   80.00
 TOTAL STREAM AREA(ACRES) =   80.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    101.36

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

```
 FLOW PROCESS FROM NODE   130.10 TO NODE   130.10 IS CODE =   7
----------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
======================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  25.90   RAIN INTENSITY(INCH/HOUR) =  1.90
 EFFECTIVE AREA(ACRES) =    95.70
 TOTAL AREA(ACRES) =    99.70   PEAK FLOW RATE(CFS) =    126.10
 AVERAGED LOSS RATE, Fm(IN/HR) =   .582


**********************************************************************
 FLOW PROCESS FROM NODE   130.10 TO NODE   130.10 IS CODE =   1
----------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
======================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MINUTES) =  25.90
 RAINFALL INTENSITY (INCH./HOUR) =   1.90
 EFFECTIVE STREAM AREA(ACRES) =   95.70
 TOTAL STREAM AREA(ACRES) =   99.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    126.10

 CONFLUENCE INFORMATION:
 STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
 NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
----------------------------------------------------------------------
   1      101.36     23.93       1.990     .58       80.00
   2      126.10     25.90       1.897     .58       95.70

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.
 SUMMARY RESULTS:
 STREAM   CONFLUENCE   EFFECTIVE
 NUMBER     Q(CFS)    AREA(ACRES)
-------------------------------------------
   1      226.03       168.41
   2      220.80       175.70
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    226.03   TIME(MINUTES) =   23.926
 EFFECTIVE AREA(ACRES) =    168.41
 TOTAL AREA(ACRES) =    179.70


**********************************************************************
 FLOW PROCESS FROM NODE   130.10 TO NODE   131.10 IS CODE =   3
----------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
======================================================================
 DEPTH OF FLOW IN  66.0 INCH PIPE IS  48.8 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  12.0
 UPSTREAM NODE ELEVATION =  1280.00
 DOWNSTREAM NODE ELEVATION =  1272.00
```

```
 FLOWLENGTH(FEET) =  1350.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    226.03
 TRAVEL TIME(MIN.) =   1.88    TC(MIN.) =  25.80

****************************************************************************
 FLOW PROCESS FROM NODE   131.00 TO NODE   131.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.902
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   80.00   SUBAREA RUNOFF(CFS) =   95.02
 EFFECTIVE AREA(ACRES) =  248.41
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  259.70
 PEAK FLOW RATE(CFS) =  295.03
 TC(MIN) =  25.80

****************************************************************************
 FLOW PROCESS FROM NODE   131.10 TO NODE   132.10 IS CODE =   4
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
 DEPTH OF FLOW IN  69.0 INCH PIPE IS  53.5 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  13.6
 UPSTREAM NODE ELEVATION =  1272.00
 DOWNSTREAM NODE ELEVATION =  1267.00
 FLOWLENGTH(FEET) =   700.00   MANNINGS N =  .013
 GIVEN PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    295.03
 TRAVEL TIME(MIN.) =    .85    TC(MIN.) =  26.66

****************************************************************************
 FLOW PROCESS FROM NODE   132.20 TO NODE   132.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.865
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   46.18
 EFFECTIVE AREA(ACRES) =  288.41
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  299.70
 PEAK FLOW RATE(CFS) =  332.98
 TC(MIN) =  26.66

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

```
 FLOW PROCESS FROM NODE   132.10 TO NODE   140.10 IS CODE =   4
----------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
======================================================================
 DEPTH OF FLOW IN  69.0 INCH PIPE IS  44.0 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  19.1
 UPSTREAM NODE ELEVATION =  1267.00
 DOWNSTREAM NODE ELEVATION =  1227.00
 FLOWLENGTH(FEET) =  2650.00   MANNINGS N =  .013
 GIVEN PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    332.98
 TRAVEL TIME(MIN.) =   2.32    TC(MIN.) =  28.97

**********************************************************************
 FLOW PROCESS FROM NODE   132.10 TO NODE   140.10 IS CODE =   3
----------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
======================================================================
 DEPTH OF FLOW IN  63.0 INCH PIPE IS  48.4 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  18.7
 UPSTREAM NODE ELEVATION =  1267.00
 DOWNSTREAM NODE ELEVATION =  1227.00
 FLOWLENGTH(FEET) =  2650.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    332.98
 TRAVEL TIME(MIN.) =   2.37    TC(MIN.) =  31.34

**********************************************************************
 FLOW PROCESS FROM NODE   140.10 TO NODE   140.10 IS CODE =   1
----------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
======================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  31.34
 RAINFALL INTENSITY (INCH./HOUR) =   1.69
 EFFECTIVE STREAM AREA(ACRES) =  288.41
 TOTAL STREAM AREA(ACRES) =  299.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    332.98

**********************************************************************
 FLOW PROCESS FROM NODE   132.10 TO NODE   132.10 IS CODE =   7
----------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
======================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  25.60   RAIN INTENSITY(INCH/HOUR) =  1.91
 EFFECTIVE AREA(ACRES) =    77.00
 TOTAL AREA(ACRES) =    77.00   PEAK FLOW RATE(CFS) =    143.70
 AVERAGED LOSS RATE, Fm(IN/HR) =   .580
```

```
****************************************************************************
  FLOW PROCESS FROM NODE   132.10 TO NODE   132.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MINUTES) =  25.60
  RAINFALL INTENSITY (INCH./HOUR) =   1.91
  EFFECTIVE STREAM AREA(ACRES) =   77.00
  TOTAL STREAM AREA(ACRES) =   77.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    143.70


****************************************************************************
  FLOW PROCESS FROM NODE  2004.00 TO NODE  2004.01 IS CODE =   2
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

  TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
  INITIAL SUBAREA FLOW-LENGTH =  1000.00
  UPSTREAM ELEVATION =   1280.00
  DOWNSTREAM ELEVATION =   1262.00
  ELEVATION DIFFERENCE =     18.00
  TC =  .412*[( 1000.00** 3.00)/(    18.00)]** .20 =   14.583
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.678
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA RUNOFF(CFS) =     14.15
  TOTAL AREA(ACRES) =      7.50   PEAK FLOW RATE(CFS) =     14.15


****************************************************************************
  FLOW PROCESS FROM NODE  2004.01 TO NODE  2004.02 IS CODE =   5
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION =   1262.00
  DOWNSTREAM NODE ELEVATION =   1244.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
  MANNINGS FACTOR =  .013   MAXIMUM DEPTH(FEET) =   2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     14.15
  FLOW VELOCITY(FEET/SEC) =   7.99   FLOW DEPTH(FEET) =    .45
  TRAVEL TIME(MIN.) =   2.09   TC(MIN.) =  16.67


****************************************************************************
  FLOW PROCESS FROM NODE  2004.10 TO NODE  2004.02 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.472
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
SUBAREA AREA(ACRES) =    7.50   SUBAREA RUNOFF(CFS) =   12.76
EFFECTIVE AREA(ACRES) =   15.00
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =   15.00
PEAK FLOW RATE(CFS) =   25.51
TC(MIN) =  16.67

****************************************************************************
  FLOW PROCESS FROM NODE  2004.02 TO NODE  2004.03 IS CODE =   5
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION =   1244.00
  DOWNSTREAM NODE ELEVATION =   1237.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   640.00
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
  MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     25.51
  FLOW VELOCITY(FEET/SEC) =   4.23   FLOW DEPTH(FEET) =   1.14
  TRAVEL TIME(MIN.) =   2.52   TC(MIN.) =  19.19

****************************************************************************
  FLOW PROCESS FROM NODE  2004.20 TO NODE  2004.03 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.272
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
SUBAREA AREA(ACRES) =    5.00   SUBAREA RUNOFF(CFS) =    7.60
EFFECTIVE AREA(ACRES) =   20.00
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =   20.00
PEAK FLOW RATE(CFS) =   30.41
TC(MIN) =  19.19

****************************************************************************
  FLOW PROCESS FROM NODE  2004.03 TO NODE  2006.10 IS CODE =   6
----------------------------------------------------------------------------
  >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM ELEVATION =   1237.00   DOWNSTREAM ELEVATION =   1235.00
  STREET LENGTH(FEET) =   320.00   CURB HEIGTH(INCHES) = 8.
  STREET HALFWIDTH(FEET) = 32.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  24.00
  INTERIOR STREET CROSSFALL(DECIMAL) =   .020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040
```

```
 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   30.41
  STREETFLOW MODEL RESULTS:
      NOTE: STREETFLOW EXCEEDS TOP OF CURB.
      THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .69
      HALFSTREET FLOODWIDTH(FEET) =   20.37
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.08
      PRODUCT OF DEPTH&VELOCITY =    2.11
 STREETFLOW TRAVELTIME(MIN) =   1.73   TC(MIN) =  20.92

  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.157
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =   20.00   PEAK FLOW RATE(CFS) =     30.41
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .69   HALFSTREET FLOODWIDTH(FEET) = 20.37
 FLOW VELOCITY(FEET/SEC.) =  3.08   DEPTH*VELOCITY =   2.11


****************************************************************************
 FLOW PROCESS FROM NODE  2006.00 TO NODE  2006.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.157
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   28.34
 EFFECTIVE AREA(ACRES) =   40.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =   40.00
 PEAK FLOW RATE(CFS) =   56.69
 TC(MIN) =  20.92


****************************************************************************
 FLOW PROCESS FROM NODE  2006.10 TO NODE  2007.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.6 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   7.8
 UPSTREAM NODE ELEVATION =  1235.00
 DOWNSTREAM NODE ELEVATION =  1232.00
 FLOWLENGTH(FEET) =   640.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
```

```
 PIPEFLOW THRU SUBAREA(CFS) =     56.69
 TRAVEL TIME(MIN.) =   1.36    TC(MIN.) =  22.28

****************************************************************************
 FLOW PROCESS FROM NODE  2007.00 TO NODE  2007.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.077
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   53.80
 EFFECTIVE AREA(ACRES) =   80.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   80.00
 PEAK FLOW RATE(CFS) =  107.61
 TC(MIN) =  22.28

****************************************************************************
 FLOW PROCESS FROM NODE  2007.10 TO NODE   140.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  34.6 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  11.1
 UPSTREAM NODE ELEVATION =  1232.00
 DOWNSTREAM NODE ELEVATION =  1227.00
 FLOWLENGTH(FEET) =   640.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   107.61
 TRAVEL TIME(MIN.) =    .96    TC(MIN.) =  23.24

****************************************************************************
 FLOW PROCESS FROM NODE  2008.21 TO NODE   140.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.025
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   51.93
 EFFECTIVE AREA(ACRES) =  120.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  120.00
 PEAK FLOW RATE(CFS) =  155.79
 TC(MIN) =  23.24

****************************************************************************
 FLOW PROCESS FROM NODE   140.10 TO NODE   140.10 IS CODE =   1
----------------------------------------------------------------------------
```

```
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MINUTES) =  23.24
  RAINFALL INTENSITY (INCH./HOUR) =   2.02
  EFFECTIVE STREAM AREA(ACRES) =  120.00
  TOTAL STREAM AREA(ACRES) =  120.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    155.79

  CONFLUENCE INFORMATION:
  STREAM    PEAK FLOW    TIME    INTENSITY     FM     EFFECTIVE
  NUMBER    RATE(CFS)   (MIN.)  (INCH/HOUR)  (IN/HR)  AREA(ACRES)
--------------------------------------------------------------------------------
    1       332.98      31.34       1.692      .58       288.41
    2       143.70      25.60       1.911      .58        77.00
    3       155.79      23.24       2.025      .58       120.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.
  SUMMARY RESULTS:
  STREAM    CONFLUENCE    EFFECTIVE
  NUMBER      Q(CFS)     AREA(ACRES)
--------------------------------------------------
    1       572.98        485.41
    2       612.68        432.57
    3       618.33        403.81
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    618.33   TIME(MINUTES) =   23.245
  EFFECTIVE AREA(ACRES) =    403.81
  TOTAL AREA(ACRES) =    496.70


********************************************************************************
  FLOW PROCESS FROM NODE   140.10 TO NODE   140.30 IS CODE =   3
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  DEPTH OF FLOW IN  78.0 INCH PIPE IS  61.3 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =  22.1
  UPSTREAM NODE ELEVATION =  1227.00
  DOWNSTREAM NODE ELEVATION =  1200.00
  FLOWLENGTH(FEET) =  1700.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  78.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    618.33
  TRAVEL TIME(MIN.) =   1.28    TC(MIN.) =  24.53


********************************************************************************
  FLOW PROCESS FROM NODE  2009.00 TO NODE   140.30 IS CODE =   8
--------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.960
```

```
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   50.00   SUBAREA RUNOFF(CFS) =   62.03
 EFFECTIVE AREA(ACRES) =  453.81
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  546.70
 PEAK FLOW RATE(CFS) =  618.33
 TC(MIN) =  24.53

****************************************************************************
 FLOW PROCESS FROM NODE   140.30 TO NODE   140.30 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  24.53
 RAINFALL INTENSITY (INCH./HOUR) =   1.96
 EFFECTIVE STREAM AREA(ACRES) =  453.81
 TOTAL STREAM AREA(ACRES) =  546.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    618.33
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =    546.70
 EFFECTIVE AREA(ACRES) =    453.81
 PEAK FLOW RATE(CFS)    =    618.33
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
**********************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        Copyright 1983,86,87 Advanced Engineering Software (aes)
           Ver. 4.1C  Release Date: 5/11/87  Serial # I00908

                        Especially prepared for:

                             HALL & FOREMAN
 ************************* DESCRIPTION OF STUDY *************************
 * W. FONTANA LINE T-7 (REVISED) FOR 25-YR. STORM.                      *
 * NOT DESIGN Q.                                                        *
 * JN 3547, T. ARROYO, 11/27/89.                                        *
 ************************************************************************

 FILE NAME: WFONT7R.025
 TIME/DATE OF STUDY: 15:52  11/27/1989
=========================================================================
 USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

 USER SPECIFIED STORM EVENT(YEAR) =   25.00
 SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
 SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =  .95
 *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
 10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =   .970
 100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
  COMPUTED RAINFALL INTENSITY DATA:
 STORM EVENT =   25.00   1-HOUR INTENSITY(INCH/HOUR) = 1.1461
 SLOPE OF INTENSITY DURATION CURVE =  .6000


**********************************************************************
 FLOW PROCESS FROM NODE   133.00 TO NODE   133.01 IS CODE =   2
----------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
======================================================================
 DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH =  1000.00
 UPSTREAM ELEVATION =   1385.00
 DOWNSTREAM ELEVATION =   1362.00
 ELEVATION DIFFERENCE =     23.00
 TC =  .412*[( 1000.00** 3.00)/(    23.00)]** .20 =   13.885
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.758
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA RUNOFF(CFS) =     14.69
 TOTAL AREA(ACRES) =      7.50   PEAK FLOW RATE(CFS) =     14.69
```

```
**************************************************************************
 FLOW PROCESS FROM NODE    133.01 TO NODE    134.01 IS CODE =   5
--------------------------------------------------------------------------
 >>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
 UPSTREAM NODE ELEVATION =    1362.00
 DOWNSTREAM NODE ELEVATION =    1344.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =     3.00    "Z" FACTOR =    2.000
 MANNINGS FACTOR =  .030    MAXIMUM DEPTH(FEET) =    2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =      14.69
 FLOW VELOCITY(FEET/SEC) =    4.48    FLOW DEPTH(FEET) =     .73
 TRAVEL TIME(MIN.) =    3.72    TC(MIN.) =  17.61

**************************************************************************
 FLOW PROCESS FROM NODE    134.00 TO NODE    134.01 IS CODE =   8
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.392
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =     7.50    SUBAREA RUNOFF(CFS) =    12.21
 EFFECTIVE AREA(ACRES) =    15.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =    15.00
 PEAK FLOW RATE(CFS) =    24.43
 TC(MIN) =  17.61

**************************************************************************
 FLOW PROCESS FROM NODE    134.01 TO NODE    134.10 IS CODE =   5
--------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
 UPSTREAM NODE ELEVATION =    1344.00
 DOWNSTREAM NODE ELEVATION =    1332.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    670.00
 CHANNEL BASE(FEET) =     3.00    "Z" FACTOR =    2.000
 MANNINGS FACTOR =  .030    MAXIMUM DEPTH(FEET) =    2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =      24.43
 FLOW VELOCITY(FEET/SEC) =    4.99    FLOW DEPTH(FEET) =     .98
 TRAVEL TIME(MIN.) =    2.24    TC(MIN.) =  19.84

**************************************************************************
 FLOW PROCESS FROM NODE    133.12 TO NODE    134.10 IS CODE =   8
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.226
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =     5.00    SUBAREA RUNOFF(CFS) =     7.40
 EFFECTIVE AREA(ACRES) =    20.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =    20.00
 PEAK FLOW RATE(CFS) =    29.59
 TC(MIN) =  19.84

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

```
 FLOW PROCESS FROM NODE   134.10 TO NODE   135.10 IS CODE =   6
----------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
======================================================================
  'STREAM ELEVATION =   1332.00   DOWNSTREAM ELEVATION =   1330.00
 STREET LENGTH(FEET) =   320.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

       **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   29.59
 ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS:
       NOTE: STREETFLOW EXCEEDS TOP OF CURB.
       THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .69
       HALFSTREET FLOODWIDTH(FEET) =   20.00
       AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.97
       PRODUCT OF DEPTH&VELOCITY =    2.04
 STREETFLOW TRAVELTIME(MIN) =   1.80   TC(MIN) =  21.64

   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.113
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 'FFECTIVE AREA(ACRES) =   20.00
  'ERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   20.00   PEAK FLOW RATE(CFS) =    29.59
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .69   HALFSTREET FLOODWIDTH(FEET) = 20.00
 FLOW VELOCITY(FEET/SEC.) =  2.97   DEPTH*VELOCITY =   2.04

**********************************************************************
 FLOW PROCESS FROM NODE   135.00 TO NODE   135.10 IS CODE =   8
----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.113
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   27.56
 EFFECTIVE AREA(ACRES) =   40.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   40.00
 PEAK FLOW RATE(CFS) =   55.12
 TC(MIN) =  21.64

**********************************************************************
 FLOW PROCESS FROM NODE   135.10 TO NODE   136.10 IS CODE =   3
----------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
======================================================================
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.0 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   8.6
 UPSTREAM NODE ELEVATION =  1330.00
 DOWNSTREAM NODE ELEVATION =  1325.50
 FLOWLENGTH(FEET) =   720.00   MANNINGS N =  .013
```

```
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =     55.12
 TRAVEL TIME(MIN.) =   1.39    TC(MIN.) =  23.03

****************************************************************************
 FLOW PROCESS FROM NODE   136.00 TO NODE   136.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.036
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   52.34
 EFFECTIVE AREA(ACRES) =   80.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   80.00
 PEAK FLOW RATE(CFS) =  104.67
 TC(MIN) =  23.03

****************************************************************************
 FLOW PROCESS FROM NODE   136.10 TO NODE   130.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.2 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  14.7
 UPSTREAM NODE ELEVATION =  1325.50
 DOWNSTREAM NODE ELEVATION =  1280.00
 FLOWLENGTH(FEET) =  2750.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    104.67
 TRAVEL TIME(MIN.) =   3.13    TC(MIN.) =  26.16

****************************************************************************
 FLOW PROCESS FROM NODE   130.10 TO NODE   130.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  26.16
 RAINFALL INTENSITY (INCH./HOUR) =   1.89
 EFFECTIVE STREAM AREA(ACRES) =   80.00
 TOTAL STREAM AREA(ACRES) =   80.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    104.67

****************************************************************************
 FLOW PROCESS FROM NODE   130.00 TO NODE   130.01 IS CODE =   2
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH =  1000.00
 UPSTREAM ELEVATION =   1334.00
 DOWNSTREAM ELEVATION =   1313.00
 ELEVATION DIFFERENCE =     21.00
 TC =  .412*[( 1000.00** 3.00)/(    21.00)]** .20 =   14.140
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.728
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
```

```
 SUBAREA RUNOFF(CFS) =     14.49
 TOTAL AREA(ACRES) =      7.50   PEAK FLOW RATE(CFS) =     14.49

****************************************************************************
 FLOW PROCESS FROM NODE   130.01 TO NODE   130.02 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1313.00
 DOWNSTREAM NODE ELEVATION =   1297.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     14.49
 FLOW VELOCITY(FEET/SEC) =   4.18   FLOW DEPTH(FEET) =    .77
 TRAVEL TIME(MIN.) =   3.99   TC(MIN.) =  18.13

****************************************************************************
 FLOW PROCESS FROM NODE   130.10 TO NODE   130.02 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.350
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =    7.50   SUBAREA RUNOFF(CFS) =   11.93
 EFFECTIVE AREA(ACRES) =   15.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   15.00
  EAK FLOW RATE(CFS) =   23.87
 TC(MIN) =  18.13

****************************************************************************
 FLOW PROCESS FROM NODE   130.02 TO NODE   130.12 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1297.00
 DOWNSTREAM NODE ELEVATION =   1285.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   720.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     23.87
 FLOW VELOCITY(FEET/SEC) =   4.88   FLOW DEPTH(FEET) =    .98
 TRAVEL TIME(MIN.) =   2.46   TC(MIN.) =  20.59

****************************************************************************
 FLOW PROCESS FROM NODE   130.20 TO NODE   130.12 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.177
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
   BAREA AREA(ACRES) =    5.00   SUBAREA RUNOFF(CFS) =    7.18
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   20.00
 PEAK FLOW RATE(CFS) =   28.72
 TC(MIN) =  20.59
```

```
****************************************************************************
FLOW PROCESS FROM NODE   130.12 TO NODE   130.22 IS CODE =   6
----------------------------------------------------------------------------
>>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1285.00   DOWNSTREAM ELEVATION =   1283.00
 STREET LENGTH(FEET) =   320.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 32.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  24.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   28.72
   STREETFLOW MODEL RESULTS:
      NOTE: STREETFLOW EXCEEDS TOP OF CURB.
      THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .69
      HALFSTREET FLOODWIDTH(FEET) =   20.37
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.91
      PRODUCT OF DEPTH&VELOCITY =    1.99
 STREETFLOW TRAVELTIME(MIN) =   1.84   TC(MIN) =  22.43

  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.069
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
  SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   20.00   PEAK FLOW RATE(CFS) =    28.72
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .69   HALFSTREET FLOODWIDTH(FEET) = 20.37
 FLOW VELOCITY(FEET/SEC.) =  2.91   DEPTH*VELOCITY =   1.99

****************************************************************************
FLOW PROCESS FROM NODE   130.21 TO NODE   130.22 IS CODE =   8
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.069
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   26.76
EFFECTIVE AREA(ACRES) =   40.00
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =   40.00
PEAK FLOW RATE(CFS) =   53.52
TC(MIN) =  22.43

****************************************************************************
FLOW PROCESS FROM NODE   130.22 TO NODE   130.10 IS CODE =   3
----------------------------------------------------------------------------
  >>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.0 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   7.6
 UPSTREAM NODE ELEVATION =  1283.00
```

```
DOWNSTREAM NODE ELEVATION =  1280.00
FLOWLENGTH(FEET) =   680.00   MANNINGS N =  .013
ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
PIPEFLOW THRU SUBAREA(CFS) =     53.52
 TRAVEL TIME(MIN.) =   1.50    TC(MIN.) =  23.93

****************************************************************************
 FLOW PROCESS FROM NODE   130.31 TO NODE   130.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.990
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   50.68
 EFFECTIVE AREA(ACRES) =   80.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   80.00
 PEAK FLOW RATE(CFS) =  101.36
 TC(MIN) =  23.93

****************************************************************************
 FLOW PROCESS FROM NODE   130.10 TO NODE   130.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MINUTES) =  23.93
 RAINFALL INTENSITY (INCH./HOUR) =   1.99
 EFFECTIVE STREAM AREA(ACRES) =   80.00
 TOTAL STREAM AREA(ACRES) =   80.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    101.36

 CONFLUENCE INFORMATION:
 STREAM    PEAK FLOW    TIME    INTENSITY     FM     EFFECTIVE
 NUMBER    RATE(CFS)   (MIN.)  (INCH/HOUR) (IN/HR) AREA(ACRES)
------------------------------------------------------------
   1       104.67      26.16       1.886      .58       80.00
   2       101.36      23.93       1.990      .58       80.00

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.
 SUMMARY RESULTS:
 STREAM    CONFLUENCE    EFFECTIVE
 NUMBER      Q(CFS)     AREA(ACRES)
-------------------------------------------
   1       198.56        160.00
   2       204.71        153.17
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    204.71   TIME(MINUTES) =   23.926
 EFFECTIVE AREA(ACRES) =    153.17
 TOTAL AREA(ACRES) =    160.00

****************************************************************************
 FLOW PROCESS FROM NODE   130.10 TO NODE   132.10 IS CODE =   3
----------------------------------------------------------------------------
   >>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  63.0 INCH PIPE IS  45.8 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  12.1
 UPSTREAM NODE ELEVATION =  1280.00
```

```
 DOWNSTREAM NODE ELEVATION =  1267.00
 FLOWLENGTH(FEET) =  2000.00    MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    204.71
  TRAVEL TIME(MIN.) =   2.74    TC(MIN.) =  26.67

****************************************************************************
 FLOW PROCESS FROM NODE   132.20 TO NODE   132.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.864
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =  120.00   SUBAREA RUNOFF(CFS) =  138.48
 EFFECTIVE AREA(ACRES) =  273.17
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  280.00
 PEAK FLOW RATE(CFS) =  315.25
 TC(MIN) =  26.67

****************************************************************************
 FLOW PROCESS FROM NODE   132.10 TO NODE   140.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  63.0 INCH PIPE IS  46.2 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  18.5
 UPSTREAM NODE ELEVATION =  1267.00
  DOWNSTREAM NODE ELEVATION =  1227.00
 FLOWLENGTH(FEET) =  2650.00    MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    315.25
 TRAVEL TIME(MIN.) =   2.38    TC(MIN.) =  29.05

****************************************************************************
 FLOW PROCESS FROM NODE   140.10 TO NODE   140.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  29.05
 RAINFALL INTENSITY (INCH./HOUR) =   1.77
 EFFECTIVE STREAM AREA(ACRES) =  273.17
 TOTAL STREAM AREA(ACRES) =  280.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    315.25

****************************************************************************
 FLOW PROCESS FROM NODE  2004.00 TO NODE  2004.01 IS CODE =   2
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
  INITIAL SUBAREA FLOW-LENGTH =  1000.00
 UPSTREAM ELEVATION =   1280.00
 DOWNSTREAM ELEVATION =   1262.00
 ELEVATION DIFFERENCE =     18.00
 TC =  .412*[( 1000.00** 3.00)/(    18.00)]** .20 =   14.583
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.678
```

```
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA RUNOFF(CFS) =     14.15
 TOTAL AREA(ACRES) =      7.50   PEAK FLOW RATE(CFS) =     14.15

****************************************************************************
 FLOW PROCESS FROM NODE  2004.01 TO NODE  2004.02 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1262.00
 DOWNSTREAM NODE ELEVATION =   1244.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .013   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     14.15
 FLOW VELOCITY(FEET/SEC) =   7.99   FLOW DEPTH(FEET) =    .45
 TRAVEL TIME(MIN.) =   2.09   TC(MIN.) =  16.67

****************************************************************************
 FLOW PROCESS FROM NODE  2004.10 TO NODE  2004.02 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.472
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =    7.50   SUBAREA RUNOFF(CFS) =   12.76
 EFFECTIVE AREA(ACRES) =   15.00
  'ERAGED Fm(INCH/HR) =   .582
 .OTAL AREA(ACRES) =   15.00
 PEAK FLOW RATE(CFS) =   25.51
 TC(MIN) =  16.67

****************************************************************************
 FLOW PROCESS FROM NODE  2004.02 TO NODE  2004.03 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1244.00
 DOWNSTREAM NODE ELEVATION =   1237.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   640.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     25.51
 FLOW VELOCITY(FEET/SEC) =   4.23   FLOW DEPTH(FEET) =   1.14
 TRAVEL TIME(MIN.) =   2.52   TC(MIN.) =  19.19

****************************************************************************
 FLOW PROCESS FROM NODE  2004.20 TO NODE  2004.03 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.272
  IL CLASSIFICATION IS "A"
 ..ESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =    5.00   SUBAREA RUNOFF(CFS) =    7.60
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   20.00
```

```
PEAK FLOW RATE(CFS) =   30.41
TC(MIN) =  19.19

****************************************************************************
FLOW PROCESS FROM NODE  2004.03 TO NODE  2006.10 IS CODE =   6
----------------------------------------------------------------------------
>>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
UPSTREAM ELEVATION =   1237.00   DOWNSTREAM ELEVATION =   1235.00
STREET LENGTH(FEET) =   320.00   CURB HEIGTH(INCHES) = 8.
STREET HALFWIDTH(FEET) = 32.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  24.00
INTERIOR STREET CROSSFALL(DECIMAL) =   .020
OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   30.41
  STREETFLOW MODEL RESULTS:
      NOTE: STREETFLOW EXCEEDS TOP OF CURB.
      THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .69
      HALFSTREET FLOODWIDTH(FEET) =   20.37
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.08
      PRODUCT OF DEPTH&VELOCITY =    2.11
STREETFLOW TRAVELTIME(MIN) =   1.73   TC(MIN) =  20.92

  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.157
 )IL CLASSIFICATION IS "A"
.ESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
EFFECTIVE AREA(ACRES) =   20.00
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =   20.00   PEAK FLOW RATE(CFS) =    30.41
END OF SUBAREA STREETFLOW HYDRAULICS:
DEPTH(FEET) =  .69   HALFSTREET FLOODWIDTH(FEET) = 20.37
FLOW VELOCITY(FEET/SEC.) =  3.08   DEPTH*VELOCITY =   2.11

****************************************************************************
FLOW PROCESS FROM NODE  2006.00 TO NODE  2006.10 IS CODE =   8
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.157
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   28.34
EFFECTIVE AREA(ACRES) =   40.00
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =   40.00
PEAK FLOW RATE(CFS) =   56.69
TC(MIN) =  20.92

****************************************************************************
  OW PROCESS FROM NODE  2006.10 TO NODE  2007.10 IS CODE =   3
----------------------------------------------------------------------------
>>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.6 INCHES
```

```
 PIPEFLOW VELOCITY(FEET/SEC.) =   7.8
 UPSTREAM NODE ELEVATION =  1235.00
 DOWNSTREAM NODE ELEVATION =  1232.00
 FLOWLENGTH(FEET) =   640.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    56.69
 TRAVEL TIME(MIN.) =   1.36    TC(MIN.) =  22.28

****************************************************************************
 FLOW PROCESS FROM NODE  2007.00 TO NODE  2007.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.077
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   53.80
 EFFECTIVE AREA(ACRES) =   80.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   80.00
 PEAK FLOW RATE(CFS) =  107.61
 TC(MIN) =  22.28

****************************************************************************
 FLOW PROCESS FROM NODE  2007.10 TO NODE   140.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  34.6 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =  11.1
 UPSTREAM NODE ELEVATION =  1232.00
 DOWNSTREAM NODE ELEVATION =  1227.00
 FLOWLENGTH(FEET) =   640.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   107.61
 TRAVEL TIME(MIN.) =    .96    TC(MIN.) =  23.24

****************************************************************************
 FLOW PROCESS FROM NODE  2008.21 TO NODE   140.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.025
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   51.93
 EFFECTIVE AREA(ACRES) =  120.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  120.00
 PEAK FLOW RATE(CFS) =  155.79
 TC(MIN) =  23.24

****************************************************************************
 FLOW PROCESS FROM NODE   140.10 TO NODE   140.10 IS CODE =   1
----------------------------------------------------------------------------
   >>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MINUTES) =  23.24
 RAINFALL INTENSITY (INCH./HOUR) =   2.02
```

```
EFFECTIVE STREAM AREA(ACRES) =  120.00
TOTAL STREAM AREA(ACRES) =  120.00
PEAK FLOW RATE(CFS) AT CONFLUENCE =    155.79

 ONFLUENCE INFORMATION:
 TREAM    PEAK FLOW    TIME    INTENSITY     FM     EFFECTIVE
NUMBER    RATE(CFS)   (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
-----------------------------------------------------------------
  1       315.25      29.05       1.771      .58       273.17
  2       155.79      23.24       2.025      .58       120.00

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR  2 STREAMS.
SUMMARY RESULTS:
STREAM    CONFLUENCE    EFFECTIVE
NUMBER      Q(CFS)     AREA(ACRES)
-------------------------------------------
  1       443.65        393.17
  2       461.81        338.56
COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =    461.81   TIME(MINUTES) =   23.245
EFFECTIVE AREA(ACRES) =    338.56
TOTAL AREA(ACRES) =    400.00

****************************************************************************
FLOW PROCESS FROM NODE   140.10 TO NODE   140.30 IS CODE =   3
----------------------------------------------------------------------------
>>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
DEPTH OF FLOW IN  69.0 INCH PIPE IS  56.2 INCHES
 IPEFLOW VELOCITY(FEET/SEC.) =  20.4
 PSTREAM NODE ELEVATION =  1227.00
DOWNSTREAM NODE ELEVATION =  1200.00
FLOWLENGTH(FEET) =  1700.00   MANNINGS N =  .013
ESTIMATED PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
PIPEFLOW THRU SUBAREA(CFS) =    461.81
TRAVEL TIME(MIN.) =   1.39    TC(MIN.) =  24.63

****************************************************************************
FLOW PROCESS FROM NODE  2009.00 TO NODE   140.30 IS CODE =   8
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.955
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
SUBAREA AREA(ACRES) =   50.00   SUBAREA RUNOFF(CFS) =   61.79
EFFECTIVE AREA(ACRES) =  388.56
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =  450.00
PEAK FLOW RATE(CFS) =  480.22
TC(MIN) =  24.63

****************************************************************************
FLOW PROCESS FROM NODE   140.30 TO NODE   140.30 IS CODE =   1
----------------------------------------------------------------------------
  >>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MINUTES) =  24.63
RAINFALL INTENSITY (INCH./HOUR) =   1.96
EFFECTIVE STREAM AREA(ACRES) =  388.56
```

```
 TOTAL STREAM AREA(ACRES) =  450.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    480.22
================================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =    450.00
 EFFECTIVE AREA(ACRES) =    388.56
 PEAK FLOW RATE(CFS)    =    480.22
================================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        Copyright 1983,86,87 Advanced Engineering Software (aes)
           Ver. 4.1C  Release Date: 5/11/87  Serial # I00908

                        Especially prepared for:

                          HALL & FOREMAN
************************** DESCRIPTION OF STUDY **************************
* W. FONTANA LINE T-7 (REVISED) FOR 100-YR. STORM.                       *
* NOT DESIGN Q.                                                          *
* T. ARROYO, JN 3547 11/27/89.                                           *
**************************************************************************

 FILE NAME: WFONT7R.100
 TIME/DATE OF STUDY: 15:55  11/27/1989
==========================================================================
 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 =  .95
 *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
 10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =   .970
  0-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
 COMPUTED RAINFALL INTENSITY DATA:
 STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) = 1.4700
 SLOPE OF INTENSITY DURATION CURVE =  .6000


**************************************************************************
 FLOW PROCESS FROM NODE   133.00 TO NODE   133.01 IS CODE =   2
--------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
 DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH =  1000.00
 UPSTREAM ELEVATION =   1385.00
 DOWNSTREAM ELEVATION =   1362.00
 ELEVATION DIFFERENCE =     23.00
 TC =  .412*[( 1000.00** 3.00)/(    23.00)]** .20 =   13.885
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.537
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA RUNOFF(CFS) =     19.95
 TOTAL AREA(ACRES) =      7.50   PEAK FLOW RATE(CFS) =     19.95
```

```
****************************************************************************
 FLOW PROCESS FROM NODE    133.01 TO NODE    134.01 IS CODE =    5
----------------------------------------------------------------------------
 >>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =    1362.00
 DOWNSTREAM NODE ELEVATION =    1344.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =     3.00    "Z" FACTOR =    2.000
 MANNINGS FACTOR =  .030    MAXIMUM DEPTH(FEET) =    2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =      19.95
 FLOW VELOCITY(FEET/SEC) =    4.68    FLOW DEPTH(FEET) =     .89
 TRAVEL TIME(MIN.) =    3.56    TC(MIN.) =  17.44

****************************************************************************
 FLOW PROCESS FROM NODE    134.00 TO NODE    134.01 IS CODE =    8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.085
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =     7.50    SUBAREA RUNOFF(CFS) =    16.89
 EFFECTIVE AREA(ACRES) =    15.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =    15.00
 PEAK FLOW RATE(CFS) =    33.79
 TC(MIN) =  17.44

****************************************************************************
 FLOW PROCESS FROM NODE    134.01 TO NODE    134.10 IS CODE =    5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =    1344.00
 DOWNSTREAM NODE ELEVATION =    1332.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   670.00
 CHANNEL BASE(FEET) =     3.00    "Z" FACTOR =    2.000
 MANNINGS FACTOR =  .030    MAXIMUM DEPTH(FEET) =    2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =      33.79
 FLOW VELOCITY(FEET/SEC) =    5.40    FLOW DEPTH(FEET) =    1.17
 TRAVEL TIME(MIN.) =    2.07    TC(MIN.) =  19.51

****************************************************************************
 FLOW PROCESS FROM NODE    133.12 TO NODE    134.10 IS CODE =    8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.884
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =     5.00    SUBAREA RUNOFF(CFS) =    10.36
 EFFECTIVE AREA(ACRES) =    20.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =    20.00
  AK FLOW RATE(CFS) =    41.44
 TC(MIN) =  19.51

****************************************************************************
 FLOW PROCESS FROM NODE    134.10 TO NODE    135.10 IS CODE =    6
```

```
>>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
UPSTREAM ELEVATION =   1332.00   DOWNSTREAM ELEVATION =   1330.00
STREET LENGTH(FEET) =   320.00   CURB HEIGTH(INCHES) = 8.
STREET HALFWIDTH(FEET) = 20.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
INTERIOR STREET CROSSFALL(DECIMAL) =   .020
OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   41.44
***STREET FLOWING FULL***
  STREETFLOW MODEL RESULTS:
      NOTE: STREETFLOW EXCEEDS TOP OF CURB.
      THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .75
      HALFSTREET FLOODWIDTH(FEET) =   20.00
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.37
      PRODUCT OF DEPTH&VELOCITY =    2.51
STREETFLOW TRAVELTIME(MIN) =   1.58   TC(MIN) =  21.10

 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.752
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
EFFECTIVE AREA(ACRES) =   20.00
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =   20.00   PEAK FLOW RATE(CFS) =    41.44
END OF SUBAREA STREETFLOW HYDRAULICS:
DEPTH(FEET) =  .75   HALFSTREET FLOODWIDTH(FEET) = 20.00
FLOW VELOCITY(FEET/SEC.) =  3.37   DEPTH*VELOCITY =   2.51

****************************************************************************
FLOW PROCESS FROM NODE   135.00 TO NODE   135.10 IS CODE =   8
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.752
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   39.06
EFFECTIVE AREA(ACRES) =   40.00
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =   40.00
PEAK FLOW RATE(CFS) =   78.13
TC(MIN) =  21.10

****************************************************************************
FLOW PROCESS FROM NODE   135.10 TO NODE   136.10 IS CODE =   3
----------------------------------------------------------------------------
>>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 PTH OF FLOW IN  45.0 INCH PIPE IS  31.5 INCHES
PIPEFLOW VELOCITY(FEET/SEC.) =   9.4
UPSTREAM NODE ELEVATION =  1330.00
DOWNSTREAM NODE ELEVATION =  1325.50
FLOWLENGTH(FEET) =   720.00   MANNINGS N =  .013
ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
```

```
PIPEFLOW THRU SUBAREA(CFS) =     78.13
TRAVEL TIME(MIN.) =   1.27    TC(MIN.) =  22.37

****************************************************************************
FLOW PROCESS FROM NODE   136.00 TO NODE   136.10 IS CODE =   8
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.657
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   74.71
EFFECTIVE AREA(ACRES) =   80.00
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =   80.00
PEAK FLOW RATE(CFS) =  149.42
TC(MIN) =  22.37

****************************************************************************
FLOW PROCESS FROM NODE   136.10 TO NODE   130.10 IS CODE =   3
----------------------------------------------------------------------------
>>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
DEPTH OF FLOW IN  45.0 INCH PIPE IS  36.3 INCHES
PIPEFLOW VELOCITY(FEET/SEC.) =  15.6
UPSTREAM NODE ELEVATION =  1325.50
DOWNSTREAM NODE ELEVATION =  1280.00
FLOWLENGTH(FEET) =  2750.00   MANNINGS N =  .013
ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
PIPEFLOW THRU SUBAREA(CFS) =   149.42
TRAVEL TIME(MIN.) =   2.93    TC(MIN.) =  25.30

****************************************************************************
FLOW PROCESS FROM NODE   130.10 TO NODE   130.10 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MINUTES) =  25.30
RAINFALL INTENSITY (INCH./HOUR) =   2.47
EFFECTIVE STREAM AREA(ACRES) =   80.00
TOTAL STREAM AREA(ACRES) =   80.00
PEAK FLOW RATE(CFS) AT CONFLUENCE =    149.42

****************************************************************************
FLOW PROCESS FROM NODE   130.00 TO NODE   130.01 IS CODE =   2
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
INITIAL SUBAREA FLOW-LENGTH =  1000.00
UPSTREAM ELEVATION =   1334.00
DOWNSTREAM ELEVATION =   1313.00
ELEVATION DIFFERENCE =     21.00
TC =  .412*[( 1000.00** 3.00)/(    21.00)]** .20 =   14.140
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.499
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
SUBAREA RUNOFF(CFS) =     19.69
```

```
 TOTAL AREA(ACRES) =      7.50   PEAK FLOW RATE(CFS) =     19.69

****************************************************************************
 FLOW PROCESS FROM NODE   130.01 TO NODE   130.02 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1313.00
 DOWNSTREAM NODE ELEVATION =   1297.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     19.69
 FLOW VELOCITY(FEET/SEC) =   4.62   FLOW DEPTH(FEET) =    .89
 TRAVEL TIME(MIN.) =   3.60   TC(MIN.) =  17.74

****************************************************************************
 FLOW PROCESS FROM NODE   130.10 TO NODE   130.02 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.053
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =    7.50   SUBAREA RUNOFF(CFS) =   16.68
 EFFECTIVE AREA(ACRES) =   15.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   15.00
 PEAK FLOW RATE(CFS) =   33.36
  TC(MIN) =  17.74

****************************************************************************
 FLOW PROCESS FROM NODE   130.02 TO NODE   130.12 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1297.00
 DOWNSTREAM NODE ELEVATION =   1285.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   720.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     33.36
 FLOW VELOCITY(FEET/SEC) =   5.33   FLOW DEPTH(FEET) =   1.17
 TRAVEL TIME(MIN.) =   2.25   TC(MIN.) =  20.00

****************************************************************************
 FLOW PROCESS FROM NODE   130.20 TO NODE   130.12 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.842
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =    5.00   SUBAREA RUNOFF(CFS) =   10.17
  EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   20.00
 PEAK FLOW RATE(CFS) =   40.68
 TC(MIN) =  20.00
```

```
****************************************************************************
 FLOW PROCESS FROM NODE   130.12 TO NODE   130.22 IS CODE =   6
----------------------------------------------------------------------------
  >>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1285.00   DOWNSTREAM ELEVATION =   1283.00
 STREET LENGTH(FEET) =   320.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 32.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  24.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   40.68
   STREETFLOW MODEL RESULTS:
      NOTE: STREETFLOW EXCEEDS TOP OF CURB.
      THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .75
      HALFSTREET FLOODWIDTH(FEET) =   23.37
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.25
      PRODUCT OF DEPTH&VELOCITY =    2.43
 STREETFLOW TRAVELTIME(MIN) =   1.64   TC(MIN) =  21.64

  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.711
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
  EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   20.00   PEAK FLOW RATE(CFS) =    40.68
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .75   HALFSTREET FLOODWIDTH(FEET) = 23.37
 FLOW VELOCITY(FEET/SEC.) =  3.25   DEPTH*VELOCITY =   2.43

****************************************************************************
 FLOW PROCESS FROM NODE   130.21 TO NODE   130.22 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.711
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   38.32
 EFFECTIVE AREA(ACRES) =   40.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   40.00
 PEAK FLOW RATE(CFS) =   76.64
 TC(MIN) =  21.64

****************************************************************************
 FLOW PROCESS FROM NODE   130.22 TO NODE   130.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
   >>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  45.0 INCH PIPE IS  36.1 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   8.1
 UPSTREAM NODE ELEVATION =  1283.00
 DOWNSTREAM NODE ELEVATION =  1280.00
```

```
 FLOWLENGTH(FEET) =   680.00   MANNINGS N =   .013
 ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =     76.64
 TRAVEL TIME(MIN.) =   1.40    TC(MIN.) =  23.04

****************************************************************************
 FLOW PROCESS FROM NODE   130.31 TO NODE   130.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.611
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   73.03
 EFFECTIVE AREA(ACRES) =   80.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   80.00
 PEAK FLOW RATE(CFS) =  146.05
 TC(MIN) =  23.04

****************************************************************************
 FLOW PROCESS FROM NODE   130.10 TO NODE   130.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MINUTES) =  23.04
 RAINFALL INTENSITY (INCH./HOUR) =   2.61
 EFFECTIVE STREAM AREA(ACRES) =   80.00
  TOTAL STREAM AREA(ACRES) =   80.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    146.05

 CONFLUENCE INFORMATION:
 STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
 NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
------------------------------------------------------------
   1      149.42     25.30       2.468     .58       80.00
   2      146.05     23.04       2.611     .58       80.00

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.
 SUMMARY RESULTS:
 STREAM   CONFLUENCE   EFFECTIVE
 NUMBER     Q(CFS)    AREA(ACRES)
-------------------------------------
   1      285.23       160.00
   2      292.41       152.86
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    292.41   TIME(MINUTES) =   23.039
 EFFECTIVE AREA(ACRES) =    152.86
 TOTAL AREA(ACRES) =    160.00

****************************************************************************
 FLOW PROCESS FROM NODE   130.10 TO NODE   132.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
   >>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  69.0 INCH PIPE IS  55.6 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  13.0
 UPSTREAM NODE ELEVATION =  1280.00
 DOWNSTREAM NODE ELEVATION =  1267.00
```

```
 FLOWLENGTH(FEET) =  2000.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    292.41
 TRAVEL TIME(MIN.) =   2.56    TC(MIN.) =  25.60

****************************************************************************
 FLOW PROCESS FROM NODE   132.20 TO NODE   132.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.451
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =  120.00   SUBAREA RUNOFF(CFS) =  201.83
 EFFECTIVE AREA(ACRES) =  272.86
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  280.00
 PEAK FLOW RATE(CFS) =  458.94
 TC(MIN) =  25.60

****************************************************************************
 FLOW PROCESS FROM NODE   132.10 TO NODE   140.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  72.0 INCH PIPE IS  53.6 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  20.3
 UPSTREAM NODE ELEVATION =  1267.00
 DOWNSTREAM NODE ELEVATION =  1227.00
  FLOWLENGTH(FEET) =  2650.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    458.94
 TRAVEL TIME(MIN.) =   2.17    TC(MIN.) =  27.77

****************************************************************************
 FLOW PROCESS FROM NODE   140.10 TO NODE   140.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  27.77
 RAINFALL INTENSITY (INCH./HOUR) =   2.33
 EFFECTIVE STREAM AREA(ACRES) =  272.86
 TOTAL STREAM AREA(ACRES) =  280.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    458.94

****************************************************************************
 FLOW PROCESS FROM NODE  2004.00 TO NODE  2004.01 IS CODE =   2
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH =  1000.00
  UPSTREAM ELEVATION =   1280.00
 DOWNSTREAM ELEVATION =   1262.00
 ELEVATION DIFFERENCE =     18.00
 TC =  .412*[( 1000.00** 3.00)/(    18.00)]** .20 =   14.583
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.435
 SOIL CLASSIFICATION IS "A"
```

```
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA RUNOFF(CFS) =     19.26
 TOTAL AREA(ACRES) =      7.50   PEAK FLOW RATE(CFS) =     19.26

****************************************************************************
 FLOW PROCESS FROM NODE  2004.01 TO NODE  2004.02 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1262.00
 DOWNSTREAM NODE ELEVATION =   1244.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =     3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .013   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     19.26
 FLOW VELOCITY(FEET/SEC) =   8.60   FLOW DEPTH(FEET) =     .55
 TRAVEL TIME(MIN.) =   1.94   TC(MIN.) =  16.52

****************************************************************************
 FLOW PROCESS FROM NODE  2004.10 TO NODE  2004.02 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.187
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =     7.50   SUBAREA RUNOFF(CFS) =   17.58
 EFFECTIVE AREA(ACRES) =   15.00
 AVERAGED Fm(INCH/HR) =    .582
  TOTAL AREA(ACRES) =   15.00
 PEAK FLOW RATE(CFS) =   35.17
 TC(MIN) =  16.52

****************************************************************************
 FLOW PROCESS FROM NODE  2004.02 TO NODE  2004.03 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1244.00
 DOWNSTREAM NODE ELEVATION =   1237.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   640.00
 CHANNEL BASE(FEET) =     3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     35.17
 FLOW VELOCITY(FEET/SEC) =   4.68   FLOW DEPTH(FEET) =   1.33
 TRAVEL TIME(MIN.) =   2.28   TC(MIN.) =  18.80

****************************************************************************
 FLOW PROCESS FROM NODE  2004.20 TO NODE  2004.03 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.949
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =     5.00   SUBAREA RUNOFF(CFS) =   10.65
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =   20.00
 PEAK FLOW RATE(CFS) =   42.61
```

```
 TC(MIN) =  18.80

****************************************************************************
 FLOW PROCESS FROM NODE  2004.03 TO NODE  2006.10 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1237.00   DOWNSTREAM ELEVATION =   1235.00
 STREET LENGTH(FEET) =   320.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 32.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  24.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   42.61
   STREETFLOW MODEL RESULTS:
      NOTE: STREETFLOW EXCEEDS TOP OF CURB.
      THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .76
      HALFSTREET FLOODWIDTH(FEET) =   24.13
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.22
      PRODUCT OF DEPTH&VELOCITY =    2.45
 STREETFLOW TRAVELTIME(MIN) =   1.65   TC(MIN) =  20.45

  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.804
 SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   20.00   PEAK FLOW RATE(CFS) =    42.61
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .76   HALFSTREET FLOODWIDTH(FEET) = 24.13
 FLOW VELOCITY(FEET/SEC.) =  3.22   DEPTH*VELOCITY =   2.45

****************************************************************************
 FLOW PROCESS FROM NODE  2006.00 TO NODE  2006.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.804
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   39.99
 EFFECTIVE AREA(ACRES) =   40.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   40.00
 PEAK FLOW RATE(CFS) =   79.98
 TC(MIN) =  20.45

****************************************************************************
 FLOW PROCESS FROM NODE  2006.10 TO NODE  2007.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  45.0 INCH PIPE IS  36.5 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   8.3
```

```
 UPSTREAM NODE ELEVATION =  1235.00
 DOWNSTREAM NODE ELEVATION =  1232.00
 FLOWLENGTH(FEET) =   640.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    79.98
 TRAVEL TIME(MIN.) =   1.28    TC(MIN.) =  21.73

****************************************************************************
 FLOW PROCESS FROM NODE  2007.00 TO NODE  2007.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.703
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   76.37
 EFFECTIVE AREA(ACRES) =   80.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   80.00
 PEAK FLOW RATE(CFS) =  152.75
 TC(MIN) =  21.73

****************************************************************************
 FLOW PROCESS FROM NODE  2007.10 TO NODE   140.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  54.0 INCH PIPE IS  40.1 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  12.1
  UPSTREAM NODE ELEVATION =  1232.00
 DOWNSTREAM NODE ELEVATION =  1227.00
 FLOWLENGTH(FEET) =   640.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   152.75
 TRAVEL TIME(MIN.) =    .88    TC(MIN.) =  22.62

****************************************************************************
 FLOW PROCESS FROM NODE  2008.21 TO NODE   140.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.640
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   74.07
 EFFECTIVE AREA(ACRES) =  120.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  120.00
 PEAK FLOW RATE(CFS) =  222.21
 TC(MIN) =  22.62

****************************************************************************
 FLOW PROCESS FROM NODE   140.10 TO NODE   140.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
   >>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MINUTES) =  22.62
 RAINFALL INTENSITY (INCH./HOUR) =   2.64
 EFFECTIVE STREAM AREA(ACRES) =  120.00
```

```
 TOTAL STREAM AREA(ACRES) =  120.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    222.21

 CONFLUENCE INFORMATION:
  STREAM    PEAK FLOW    TIME    INTENSITY     FM     EFFECTIVE
  NUMBER    RATE(CFS)   (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
 ----------------------------------------------------------------
    1       458.94      27.77       2.334      .58       272.86
    2       222.21      22.62       2.640      .58       120.00

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.
 SUMMARY RESULTS:
 STREAM    CONFLUENCE    EFFECTIVE
 NUMBER      Q(CFS)     AREA(ACRES)
 ------------------------------------------
    1       648.14        392.86
    2       661.26        342.25
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    661.26   TIME(MINUTES) =   22.619
 EFFECTIVE AREA(ACRES) =    342.25
 TOTAL AREA(ACRES) =    400.00

****************************************************************************
 FLOW PROCESS FROM NODE   140.10 TO NODE   140.30 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  81.0 INCH PIPE IS  61.7 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  22.6
  UPSTREAM NODE ELEVATION =  1227.00
 DOWNSTREAM NODE ELEVATION =  1200.00
 FLOWLENGTH(FEET) =  1700.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  81.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   661.26
 TRAVEL TIME(MIN.) =   1.25    TC(MIN.) =  23.87

****************************************************************************
 FLOW PROCESS FROM NODE  2009.00 TO NODE   140.30 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.555
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   50.00   SUBAREA RUNOFF(CFS) =   88.81
 EFFECTIVE AREA(ACRES) =  392.25
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  450.00
 PEAK FLOW RATE(CFS) =  696.69
 TC(MIN) =  23.87

****************************************************************************
 FLOW PROCESS FROM NODE   140.30 TO NODE   140.30 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  23.87
 RAINFALL INTENSITY (INCH./HOUR) =   2.56
 EFFECTIVE STREAM AREA(ACRES) =  392.25
 TOTAL STREAM AREA(ACRES) =  450.00
```

```
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    696.69
 ================================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =    450.00
 EFFECTIVE AREA(ACRES) =    392.25
 PEAK FLOW RATE(CFS)    =    696.69
 ================================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        Copyright 1983,86,87 Advanced Engineering Software (aes)
           Ver. 4.1C  Release Date: 5/11/87  Serial # I00908

                        Especially prepared for:

                             HALL & FOREMAN
 ************************** DESCRIPTION OF STUDY **********************
* N. FONTANA MASTER S.D. PLAN, W. FONTANA CHANNEL LAT. 8
* Q 100-25 YEAR, DESIGN Q FOR NORTHERN PORTION LINE T-8, INCLUDES BASEL
* OVERFLOW, JN3547
 **************************************************************************

  FILE NAME: WFONT8RA.DES
  TIME/DATE OF STUDY:  0:59   1/ 1/1980
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =   .970
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   25.00   1-HOUR INTENSITY(INCH/HOUR) = 1.1461
  SLOPE OF INTENSITY DURATION CURVE =  .6000


**************************************************************************
  FLOW PROCESS FROM NODE   137.00 TO NODE   137.01 IS CODE =   2
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

  TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
  INITIAL SUBAREA FLOW-LENGTH =  1000.00
  UPSTREAM ELEVATION =   1375.00
  DOWNSTREAM ELEVATION =   1352.00
  ELEVATION DIFFERENCE =     23.00
  TC =  .412*[( 1000.00** 3.00)/(    23.00)]** .20 =   13.885
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.758
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA RUNOFF(CFS) =     14.69
  TOTAL AREA(ACRES) =      7.50   PEAK FLOW RATE(CFS) =     14.69
```

```
****************************************************************************
 FLOW PROCESS FROM NODE   137.01 TO NODE   137.02 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1352.00
 DOWNSTREAM NODE ELEVATION =   1335.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     14.69
 FLOW VELOCITY(FEET/SEC) =   4.23   FLOW DEPTH(FEET) =    .77
 TRAVEL TIME(MIN.) =   3.94   TC(MIN.) =  17.82


****************************************************************************
 FLOW PROCESS FROM NODE   137.10 TO NODE   137.02 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.374
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =    7.50   SUBAREA RUNOFF(CFS) =   12.10
 EFFECTIVE AREA(ACRES) =   15.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   15.00
 PEAK FLOW RATE(CFS) =   24.20
 TC(MIN) =  17.82


****************************************************************************
 FLOW PROCESS FROM NODE   137.02 TO NODE   132.12 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1335.00
 DOWNSTREAM NODE ELEVATION =   1323.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   630.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     24.20
 FLOW VELOCITY(FEET/SEC) =   5.17   FLOW DEPTH(FEET) =    .95
 TRAVEL TIME(MIN.) =   2.03   TC(MIN.) =  19.85


****************************************************************************
 FLOW PROCESS FROM NODE   137.20 TO NODE   132.12 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.226
 SOIL CLASSIFICATION IS "A"
```

```
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     5.00   SUBAREA RUNOFF(CFS) =     7.40
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =   20.00
 PEAK FLOW RATE(CFS) =   29.59
 TC(MIN) =  19.85


****************************************************************************
 FLOW PROCESS FROM NODE   132.12 TO NODE   137.10 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1323.00   DOWNSTREAM ELEVATION =   1321.00
 STREET LENGTH(FEET) =   320.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

       **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   29.59
 ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS:
       NOTE: STREETFLOW EXCEEDS TOP OF CURB.
       THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .69
       HALFSTREET FLOODWIDTH(FEET) =   20.00
       AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.97
       PRODUCT OF DEPTH&VELOCITY =    2.04
 STREETFLOW TRAVELTIME(MIN) =   1.80   TC(MIN) =  21.65

   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.113
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =   20.00   PEAK FLOW RATE(CFS) =     29.59
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .69   HALFSTREET FLOODWIDTH(FEET) = 20.00
 FLOW VELOCITY(FEET/SEC.) =  2.97   DEPTH*VELOCITY =   2.04


****************************************************************************
 FLOW PROCESS FROM NODE   137.21 TO NODE   137.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.113
```

```
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   27.56
 EFFECTIVE AREA(ACRES) =   40.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   40.00
 PEAK FLOW RATE(CFS) =   55.11
 TC(MIN) =  21.65


****************************************************************************
 FLOW PROCESS FROM NODE   137.10 TO NODE   138.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.9 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   8.7
 UPSTREAM NODE ELEVATION =  1321.00
 DOWNSTREAM NODE ELEVATION =  1317.00
 FLOWLENGTH(FEET) =   630.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =     55.11
 TRAVEL TIME(MIN.) =   1.21    TC(MIN.) =  22.86


****************************************************************************
 FLOW PROCESS FROM NODE   138.00 TO NODE   138.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.045
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   52.67
 EFFECTIVE AREA(ACRES) =   80.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   80.00
 PEAK FLOW RATE(CFS) =  105.34
 TC(MIN) =  22.86


****************************************************************************
 FLOW PROCESS FROM NODE   138.10 TO NODE   138.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  22.86
 RAINFALL INTENSITY (INCH./HOUR) =   2.05
 EFFECTIVE STREAM AREA(ACRES) =   80.00
 TOTAL STREAM AREA(ACRES) =   80.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    105.34
```

```
****************************************************************************
 FLOW PROCESS FROM NODE   227.11 TO NODE   227.11 IS CODE =   7
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  18.60   RAIN INTENSITY(INCH/HOUR) =  2.31
 EFFECTIVE AREA(ACRES) =    50.70
 TOTAL AREA(ACRES) =    50.70   PEAK FLOW RATE(CFS) =     84.60
 AVERAGED LOSS RATE, Fm(IN/HR) =   .582


****************************************************************************
 FLOW PROCESS FROM NODE   227.11 TO NODE   138.10 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1365.00   DOWNSTREAM ELEVATION =   1317.00
 STREET LENGTH(FEET) =  2600.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

       **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   84.60
 ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS:
       NOTE: STREETFLOW EXCEEDS TOP OF CURB.
       THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .77
       HALFSTREET FLOODWIDTH(FEET) =   20.00
       AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.46
       PRODUCT OF DEPTH&VELOCITY =    4.95
 STREETFLOW TRAVELTIME(MIN) =   6.71   TC(MIN) =  25.31

   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.924
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   50.70
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   50.70   PEAK FLOW RATE(CFS) =     84.60
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .77   HALFSTREET FLOODWIDTH(FEET) = 20.00
 FLOW VELOCITY(FEET/SEC.) =  6.46   DEPTH*VELOCITY =   4.95


****************************************************************************
 FLOW PROCESS FROM NODE   138.10 TO NODE   138.10 IS CODE =   1
----------------------------------------------------------------------------
```

```
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MINUTES) =  25.31
  RAINFALL INTENSITY (INCH./HOUR) =   1.92
  EFFECTIVE STREAM AREA(ACRES) =   50.70
  TOTAL STREAM AREA(ACRES) =   50.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     84.60

  CONFLUENCE INFORMATION:
  STREAM    PEAK FLOW    TIME    INTENSITY     FM     EFFECTIVE
  NUMBER    RATE(CFS)   (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
--------------------------------------------------------------------
    1       105.34      22.86       2.045     .58        80.00
    2        84.60      25.31       1.924     .58        50.70

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.
  SUMMARY RESULTS:
  STREAM    CONFLUENCE    EFFECTIVE
  NUMBER      Q(CFS)     AREA(ACRES)
-----------------------------------------------
    1       188.65        125.79
    2       181.21        130.70
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    188.65   TIME(MINUTES) =   22.856
  EFFECTIVE AREA(ACRES) =    125.79
  TOTAL AREA(ACRES) =    130.70


****************************************************************************
  FLOW PROCESS FROM NODE   138.10 TO NODE   139.11 IS CODE =   3
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  DEPTH OF FLOW IN  57.0 INCH PIPE IS  44.6 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =  12.7
  UPSTREAM NODE ELEVATION =  1317.00
  DOWNSTREAM NODE ELEVATION =  1312.00
  FLOWLENGTH(FEET) =   630.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =   188.65
  TRAVEL TIME(MIN.) =    .83    TC(MIN.) =  23.68


****************************************************************************
  FLOW PROCESS FROM NODE   139.20 TO NODE   139.11 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.002
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
```

```
  SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   51.12
  EFFECTIVE AREA(ACRES) =  165.79
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =  170.70
  PEAK FLOW RATE(CFS) =  211.86
  TC(MIN) =  23.68

****************************************************************************
  FLOW PROCESS FROM NODE   139.11 TO NODE   139.11 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MINUTES) =  23.68
  RAINFALL INTENSITY (INCH./HOUR) =   2.00
  EFFECTIVE STREAM AREA(ACRES) =  165.79
  TOTAL STREAM AREA(ACRES) =  170.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    211.86

****************************************************************************
  FLOW PROCESS FROM NODE   227.10 TO NODE   227.10 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  18.60   RAIN INTENSITY(INCH/HOUR) =  2.31
  EFFECTIVE AREA(ACRES) =    43.60
  TOTAL AREA(ACRES) =    43.60   PEAK FLOW RATE(CFS) =     99.90
  AVERAGED LOSS RATE, Fm(IN/HR) =   .582

****************************************************************************
  FLOW PROCESS FROM NODE   227.10 TO NODE   139.11 IS CODE =   6
----------------------------------------------------------------------------
  >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM ELEVATION =   1362.00   DOWNSTREAM ELEVATION =   1312.00
  STREET LENGTH(FEET) =  2600.00   CURB HEIGTH(INCHES) = 8.
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
  INTERIOR STREET CROSSFALL(DECIMAL) =   .020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

        **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   99.90
  ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS:
       . NOTE: STREETFLOW EXCEEDS TOP OF CURB.
         THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =    .81
        HALFSTREET FLOODWIDTH(FEET) =   20.00
        AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.82
        PRODUCT OF DEPTH&VELOCITY =    5.49
  STREETFLOW TRAVELTIME(MIN) =   6.36   TC(MIN) =  24.96

    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.940
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
  EFFECTIVE AREA(ACRES) =   43.60
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =   43.60   PEAK FLOW RATE(CFS) =     99.90
  END OF SUBAREA STREETFLOW HYDRAULICS:
  DEPTH(FEET) =  .81   HALFSTREET FLOODWIDTH(FEET) = 20.00
  FLOW VELOCITY(FEET/SEC.) =  6.82   DEPTH*VELOCITY =   5.49


****************************************************************************
  FLOW PROCESS FROM NODE   139.11 TO NODE   139.11 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MINUTES) =  24.96
  RAINFALL INTENSITY (INCH./HOUR) =   1.94
  EFFECTIVE STREAM AREA(ACRES) =   43.60
  TOTAL STREAM AREA(ACRES) =   43.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     99.90

  CONFLUENCE INFORMATION:
  STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
  NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
----------------------------------------------------------------------
    1      211.86     23.68       2.002     .58      165.79
    2       99.90     24.96       1.940     .58       43.60

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.
  SUMMARY RESULTS:
  STREAM   CONFLUENCE   EFFECTIVE
  NUMBER     Q(CFS)    AREA(ACRES)
------------------------------------------
    1      310.99       207.17
    2      302.52       209.39
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    310.99   TIME(MINUTES) =   23.685
  EFFECTIVE AREA(ACRES) =    207.17
  TOTAL AREA(ACRES) =    214.30


****************************************************************************
  FLOW PROCESS FROM NODE   139.11 TO NODE   139.12 IS CODE =   3
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  48.1 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =  18.4
  UPSTREAM NODE ELEVATION =  1312.00
  DOWNSTREAM NODE ELEVATION =  1287.00
  FLOWLENGTH(FEET) =  1600.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =   310.99
  TRAVEL TIME(MIN.) =   1.45    TC(MIN.) =  25.13


****************************************************************************
  FLOW PROCESS FROM NODE   509.00 TO NODE   139.12 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.932
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   21.00   SUBAREA RUNOFF(CFS) =   25.51
  EFFECTIVE AREA(ACRES) =  228.17
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =  235.30
  PEAK FLOW RATE(CFS) =  310.99
  TC(MIN) =  25.13


****************************************************************************
  FLOW PROCESS FROM NODE   139.12 TO NODE   132.10 IS CODE =   3
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  45.2 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =  19.6
  UPSTREAM NODE ELEVATION =  1287.00
  DOWNSTREAM NODE ELEVATION =  1267.00
  FLOWLENGTH(FEET) =  1120.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =   310.99
  TRAVEL TIME(MIN.) =    .95    TC(MIN.) =  26.09


****************************************************************************
  FLOW PROCESS FROM NODE   132.10 TO NODE   132.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MINUTES) =  26.09
  RAINFALL INTENSITY (INCH./HOUR) =   1.89
  EFFECTIVE STREAM AREA(ACRES) =  228.17
```

```
 TOTAL STREAM AREA(ACRES) =  235.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    310.99

 CONFLUENCE INFORMATION:
 STREAM    PEAK FLOW    TIME    INTENSITY     FM     EFFECTIVE
 NUMBER    RATE(CFS)   (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
-----------------------------------------------------------------
   1       310.99      26.09       1.889      .58       228.17

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  1 STREAMS.
 SUMMARY RESULTS:
 STREAM    CONFLUENCE    EFFECTIVE
 NUMBER      Q(CFS)     AREA(ACRES)
-----------------------------------------------
   1       310.99        228.17
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    310.99   TIME(MINUTES) =   26.085
 EFFECTIVE AREA(ACRES) =    228.17
 TOTAL AREA(ACRES) =    235.30
=================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =    235.30
 EFFECTIVE AREA(ACRES) =    228.17
 PEAK FLOW RATE(CFS)    =    310.99
=================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        Copyright 1983,86,87 Advanced Engineering Software (aes)
           Ver. 4.1C  Release Date: 5/11/87  Serial # I00908

                        Especially prepared for:

                              HALL & FOREMAN
 *************************** DESCRIPTION OF STUDY ***********************
* N. FONTANA MASTER S.D. PLAN, W. FONTANA CHANNEL LAT. 8
* Q 100-25 YEAR, DESIGN Q FOR SOUTHERN PORTION, INCLUDES BASELINE OVERF
* JN 3547
 **************************************************************************

  FILE NAME: WFONT8RB.DES
  TIME/DATE OF STUDY:  2:25   1/ 1/1980
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =   .970
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   25.00   1-HOUR INTENSITY(INCH/HOUR) = 1.1461
  SLOPE OF INTENSITY DURATION CURVE =  .6000


**************************************************************************
  FLOW PROCESS FROM NODE   132.10 TO NODE   132.10 IS CODE =   7
--------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
==========================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  26.10   RAIN INTENSITY(INCH/HOUR) =  1.89
  EFFECTIVE AREA(ACRES) =   228.20
  TOTAL AREA(ACRES) =   235.30   PEAK FLOW RATE(CFS) =    311.00
  AVERAGED LOSS RATE, Fm(IN/HR) =   .580


**************************************************************************
  FLOW PROCESS FROM NODE   132.10 TO NODE   132.11 IS CODE =   4
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
==========================================================================
  PIPEFLOW VELOCITY(FEET/SEC.) =  13.1
  UPSTREAM NODE ELEVATION =  1267.00
```

```
 DOWNSTREAM NODE ELEVATION =  1260.00
 FLOWLENGTH(FEET) =  1000.00   MANNINGS N =  .013
 GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    311.00
 TRAVEL TIME(MIN.) =   1.27    TC(MIN.) =  27.37

****************************************************************************
 FLOW PROCESS FROM NODE   509.10 TO NODE   132.11 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.835
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   27.00   SUBAREA RUNOFF(CFS) =   30.46
 EFFECTIVE AREA(ACRES) =  255.20
 AVERAGED Fm(INCH/HR) =   .580
 TOTAL AREA(ACRES) =  262.30
 PEAK FLOW RATE(CFS) =  311.00
 TC(MIN) =  27.37

****************************************************************************
 FLOW PROCESS FROM NODE   132.11 TO NODE   600.01 IS CODE =   4
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
 PIPEFLOW VELOCITY(FEET/SEC.) =  12.0
 UPSTREAM NODE ELEVATION =  1260.00
 DOWNSTREAM NODE ELEVATION =  1258.00
 FLOWLENGTH(FEET) =   300.00   MANNINGS N =  .013
 GIVEN PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    311.00
 TRAVEL TIME(MIN.) =    .42    TC(MIN.) =  27.79

****************************************************************************
 FLOW PROCESS FROM NODE   600.01 TO NODE   600.02 IS CODE =   4
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
 DEPTH OF FLOW IN  69.0 INCH PIPE IS  41.5 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  19.1
 UPSTREAM NODE ELEVATION =  1258.00
 DOWNSTREAM NODE ELEVATION =  1240.00
 FLOWLENGTH(FEET) =  1150.00   MANNINGS N =  .013
 GIVEN PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    311.00
 TRAVEL TIME(MIN.) =   1.01    TC(MIN.) =  28.80

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

```
 FLOW PROCESS FROM NODE   600.02 TO NODE   600.02 IS CODE =   1
----------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
======================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  28.80
 RAINFALL INTENSITY (INCH./HOUR) =   1.78
 EFFECTIVE STREAM AREA(ACRES) =  255.20
 TOTAL STREAM AREA(ACRES) =  262.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    311.00


**********************************************************************
 FLOW PROCESS FROM NODE   600.50 TO NODE   600.51 IS CODE =   2
----------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
======================================================================
 DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 5-7 DWELLINGS/ACRE

 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH =   900.00
 UPSTREAM ELEVATION =   1267.00
 DOWNSTREAM ELEVATION =   1252.00
 ELEVATION DIFFERENCE =     15.00
 TC =  .389*[(  900.00** 3.00)/(    15.00)]** .20 =   13.405
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.817
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 5-7 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .4
 SUBAREA RUNOFF(CFS) =     19.94
 TOTAL AREA(ACRES) =      9.50   PEAK FLOW RATE(CFS) =     19.94


**********************************************************************
 FLOW PROCESS FROM NODE   600.51 TO NODE   600.61 IS CODE =   5
----------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
======================================================================
 UPSTREAM NODE ELEVATION =   1252.00
 DOWNSTREAM NODE ELEVATION =   1242.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   550.00
 CHANNEL BASE(FEET) =   40.00   "Z" FACTOR =  99.990
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   1.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     19.94
 FLOW VELOCITY(FEET/SEC) =   2.03   FLOW DEPTH(FEET) =    .17
 TRAVEL TIME(MIN.) =   4.52   TC(MIN.) =  17.92


**********************************************************************
 FLOW PROCESS FROM NODE   600.60 TO NODE   600.61 IS CODE =   8
----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.366
 SOIL CLASSIFICATION IS "A"
```

```
 RESIDENTIAL-> 5-7 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .4
 SUBAREA AREA(ACRES) =     9.50   SUBAREA RUNOFF(CFS) =    16.08
 EFFECTIVE AREA(ACRES) =   19.00
 AVERAGED Fm(INCH/HR) =    .485
 TOTAL AREA(ACRES) =   19.00
 PEAK FLOW RATE(CFS) =   32.17
 TC(MIN) =  17.92


****************************************************************************
 FLOW PROCESS FROM NODE    600.61 TO NODE    600.02 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =    1242.00    DOWNSTREAM ELEVATION =    1240.00
 STREET LENGTH(FEET) =    700.00    CURB HEIGTH(INCHES) = 6.
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  10.00
 INTERIOR STREET CROSSFALL(DECIMAL) =    .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =    .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

       **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =    32.17
 ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS:
       NOTE: STREETFLOW EXCEEDS TOP OF CURB.
       THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =    .74
       HALFSTREET FLOODWIDTH(FEET) =   18.00
       AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.57
       PRODUCT OF DEPTH&VELOCITY =    1.91
 STREETFLOW TRAVELTIME(MIN) =   4.54   TC(MIN) =  22.47

   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.066
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 5-7 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .4
 SUBAREA AREA(ACRES) =      .00   SUBAREA RUNOFF(CFS) =      .00
 EFFECTIVE AREA(ACRES) =   19.00
 AVERAGED Fm(INCH/HR) =    .485
 TOTAL AREA(ACRES) =   19.00   PEAK FLOW RATE(CFS) =     32.17
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .74   HALFSTREET FLOODWIDTH(FEET) = 18.00
 FLOW VELOCITY(FEET/SEC.) =  2.57   DEPTH*VELOCITY =   1.91


****************************************************************************
 FLOW PROCESS FROM NODE    600.30 TO NODE    600.02 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.066
```

```
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 5-7 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .4
 SUBAREA AREA(ACRES) =   18.00   SUBAREA RUNOFF(CFS) =   25.62
 EFFECTIVE AREA(ACRES) =   37.00
 AVERAGED Fm(INCH/HR) =   .485
 TOTAL AREA(ACRES) =   37.00
 PEAK FLOW RATE(CFS) =   52.66
 TC(MIN) =  22.47


****************************************************************************
 FLOW PROCESS FROM NODE   600.02 TO NODE   600.02 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MINUTES) =  22.47
 RAINFALL INTENSITY (INCH./HOUR) =   2.07
 EFFECTIVE STREAM AREA(ACRES) =   37.00
 TOTAL STREAM AREA(ACRES) =   37.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     52.66

 CONFLUENCE INFORMATION:
 STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
 NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
----------------------------------------------------------------
   1      311.00     28.80       1.780     .58      255.20
   2       52.66     22.47       2.066     .48       37.00

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.
 SUMMARY RESULTS:
 STREAM   CONFLUENCE   EFFECTIVE
 NUMBER     Q(CFS)    AREA(ACRES)
-----------------------------------------
   1      354.14       292.20
   2      353.10       236.10
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    354.14   TIME(MINUTES) =   28.796
 EFFECTIVE AREA(ACRES) =    292.20
 TOTAL AREA(ACRES) =    299.30


****************************************************************************
 FLOW PROCESS FROM NODE   600.02 TO NODE   600.03 IS CODE =   4
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
 DEPTH OF FLOW IN  69.0 INCH PIPE IS  44.4 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  20.1
 UPSTREAM NODE ELEVATION =  1240.00
 DOWNSTREAM NODE ELEVATION =  1215.00
 FLOWLENGTH(FEET) =  1500.00   MANNINGS N =  .013
```

```
 GIVEN PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    354.14
 TRAVEL TIME(MIN.) =   1.25    TC(MIN.) =  30.04

****************************************************************************
 FLOW PROCESS FROM NODE   600.40 TO NODE   600.03 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.736
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   48.00   SUBAREA RUNOFF(CFS) =   49.84
 EFFECTIVE AREA(ACRES) =  340.20
 AVERAGED Fm(INCH/HR) =   .570
 TOTAL AREA(ACRES) =  347.30
 PEAK FLOW RATE(CFS) =  356.89
 TC(MIN) =  30.04

****************************************************************************
 FLOW PROCESS FROM NODE   600.03 TO NODE   600.04 IS CODE =   4
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
 DEPTH OF FLOW IN  69.0 INCH PIPE IS  47.9 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  18.6
 UPSTREAM NODE ELEVATION =  1215.00
 DOWNSTREAM NODE ELEVATION =  1191.00
 FLOWLENGTH(FEET) =  1750.00   MANNINGS N =  .013
 GIVEN PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    356.89
 TRAVEL TIME(MIN.) =   1.57    TC(MIN.) =  31.61

****************************************************************************
 FLOW PROCESS FROM NODE   600.50 TO NODE   600.04 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.683
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   56.00   SUBAREA RUNOFF(CFS) =   55.51
 EFFECTIVE AREA(ACRES) =  396.20
 AVERAGED Fm(INCH/HR) =   .572
 TOTAL AREA(ACRES) =  403.30
 PEAK FLOW RATE(CFS) =  396.40
 TC(MIN) =  31.61

****************************************************************************
 FLOW PROCESS FROM NODE   600.04 TO NODE   600.04 IS CODE =   1
```

```
----------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
======================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MINUTES) =  31.61
  RAINFALL INTENSITY (INCH./HOUR) =   1.68
  EFFECTIVE STREAM AREA(ACRES) =  396.20
  TOTAL STREAM AREA(ACRES) =  403.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    396.40
======================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =    403.30
  EFFECTIVE AREA(ACRES) =    396.20
  PEAK FLOW RATE(CFS)    =    396.40
======================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        Copyright 1983,86,87 Advanced Engineering Software (aes)
           Ver. 4.1C  Release Date: 5/11/87  Serial # I00908

                        Especially prepared for:

                           HALL & FOREMAN
 ************************* DESCRIPTION OF STUDY **********************
* N.FONTANA MASTER S.D. LINE T-8, DOES NOT INCLUDE OVERFLOWS
* NOT DESIGN Q
* VENKI.N, JN 3547, 7/11/90,REVISION REQUESTED BY CITY AND COUNTY
 *************************************************************************

  FILE NAME: A:WFONT8R.025
  TIME/DATE OF STUDY:  8:41   7/11/1990
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =    .970
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   25.00   1-HOUR INTENSITY(INCH/HOUR) = 1.1461
  SLOPE OF INTENSITY DURATION CURVE =  .6000



**************************************************************************
  FLOW PROCESS FROM NODE   137.00 TO NODE   137.01 IS CODE =   2
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

  TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
  INITIAL SUBAREA FLOW-LENGTH =  1000.00
  UPSTREAM ELEVATION =   1375.00
  DOWNSTREAM ELEVATION =   1352.00
  ELEVATION DIFFERENCE =     23.00
  TC =  .412*[( 1000.00** 3.00)/(    23.00)]** .20 =   13.885
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.758
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA RUNOFF(CFS) =     14.69
  TOTAL AREA(ACRES) =      7.50   PEAK FLOW RATE(CFS) =     14.69
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    137.01 TO NODE    137.02 IS CODE =    5
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION =    1352.00
  DOWNSTREAM NODE ELEVATION =    1335.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
  CHANNEL BASE(FEET) =     3.00    "Z" FACTOR =    2.000
  MANNINGS FACTOR =  .030    MAXIMUM DEPTH(FEET) =    2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      14.69
  FLOW VELOCITY(FEET/SEC) =    4.23    FLOW DEPTH(FEET) =     .77
  TRAVEL TIME(MIN.) =    3.94    TC(MIN.) =  17.82


****************************************************************************
  FLOW PROCESS FROM NODE    137.10 TO NODE    137.02 IS CODE =    8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.374
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =   .5
  SUBAREA AREA(ACRES) =     7.50    SUBAREA RUNOFF(CFS) =    12.10
  EFFECTIVE AREA(ACRES) =    15.00
  AVERAGED Fm(INCH/HR) =    .582
  TOTAL AREA(ACRES) =    15.00
  PEAK FLOW RATE(CFS) =    24.20
  TC(MIN) =  17.82


****************************************************************************
  FLOW PROCESS FROM NODE    137.02 TO NODE    132.12 IS CODE =    5
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION =    1335.00
  DOWNSTREAM NODE ELEVATION =    1323.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   630.00
  CHANNEL BASE(FEET) =     3.00    "Z" FACTOR =    2.000
  MANNINGS FACTOR =  .030    MAXIMUM DEPTH(FEET) =    2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =      24.20
  FLOW VELOCITY(FEET/SEC) =    5.17    FLOW DEPTH(FEET) =     .95
  TRAVEL TIME(MIN.) =    2.03    TC(MIN.) =  19.85


****************************************************************************
  FLOW PROCESS FROM NODE    137.20 TO NODE    132.12 IS CODE =    8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.226
  SOIL CLASSIFICATION IS "A"
```

```
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     5.00   SUBAREA RUNOFF(CFS) =     7.40
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =   20.00
 PEAK FLOW RATE(CFS) =   29.59
 TC(MIN) =  19.85


****************************************************************************
 FLOW PROCESS FROM NODE   132.12 TO NODE   137.10 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1323.00   DOWNSTREAM ELEVATION =   1321.00
 STREET LENGTH(FEET) =   320.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
 INTERIOR STREET CROSSFALL(DECIMAL) =    .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =    .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

       **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   29.59
 ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS:
       NOTE: STREETFLOW EXCEEDS TOP OF CURB.
       THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =    .69
       HALFSTREET FLOODWIDTH(FEET) =   20.00
       AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.97
       PRODUCT OF DEPTH&VELOCITY =    2.04
 STREETFLOW TRAVELTIME(MIN) =   1.80   TC(MIN) =  21.65

   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.113
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =      .00   SUBAREA RUNOFF(CFS) =      .00
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =   20.00   PEAK FLOW RATE(CFS) =     29.59
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .69   HALFSTREET FLOODWIDTH(FEET) = 20.00
 FLOW VELOCITY(FEET/SEC.) =  2.97   DEPTH*VELOCITY =   2.04


****************************************************************************
 FLOW PROCESS FROM NODE   137.21 TO NODE   137.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.113
```

```
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   27.56
 EFFECTIVE AREA(ACRES) =   40.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   40.00
 PEAK FLOW RATE(CFS) =   55.11
 TC(MIN) =  21.65


****************************************************************************
 FLOW PROCESS FROM NODE   137.10 TO NODE   138.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.9 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   8.7
 UPSTREAM NODE ELEVATION =  1321.00
 DOWNSTREAM NODE ELEVATION =  1317.00
 FLOWLENGTH(FEET) =   630.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    55.11
 TRAVEL TIME(MIN.) =   1.21    TC(MIN.) =  22.86


****************************************************************************
 FLOW PROCESS FROM NODE   138.00 TO NODE   138.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.045
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   52.67
 EFFECTIVE AREA(ACRES) =   80.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   80.00
 PEAK FLOW RATE(CFS) =  105.34
 TC(MIN) =  22.86


****************************************************************************
 FLOW PROCESS FROM NODE   138.10 TO NODE   139.11 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  33.8 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  11.1
 UPSTREAM NODE ELEVATION =  1317.00
 DOWNSTREAM NODE ELEVATION =  1312.00
 FLOWLENGTH(FEET) =   630.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    105.34
```

```
 TRAVEL TIME(MIN.) =    .94    TC(MIN.) =  23.80

****************************************************************************
 FLOW PROCESS FROM NODE   139.20 TO NODE   139.11 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.996
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   50.91
 EFFECTIVE AREA(ACRES) =  120.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  120.00
 PEAK FLOW RATE(CFS) =  152.72
 TC(MIN) =  23.80


****************************************************************************
 FLOW PROCESS FROM NODE   139.11 TO NODE   139.12 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  34.7 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  15.7
 UPSTREAM NODE ELEVATION =  1312.00
 DOWNSTREAM NODE ELEVATION =  1287.00
 FLOWLENGTH(FEET) =  1600.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   152.72
 TRAVEL TIME(MIN.) =   1.70    TC(MIN.) =  25.50


****************************************************************************
 FLOW PROCESS FROM NODE   509.00 TO NODE   139.12 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.915
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   21.00   SUBAREA RUNOFF(CFS) =   25.20
 EFFECTIVE AREA(ACRES) =  141.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  141.00
 PEAK FLOW RATE(CFS) =  169.18
 TC(MIN) =  25.50


****************************************************************************
 FLOW PROCESS FROM NODE   139.12 TO NODE   132.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
```

```
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  35.7 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  16.9
 UPSTREAM NODE ELEVATION =  1287.00
 DOWNSTREAM NODE ELEVATION =  1267.00
 FLOWLENGTH(FEET) =  1120.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    169.18
 TRAVEL TIME(MIN.) =   1.11    TC(MIN.) =  26.61


****************************************************************************
 FLOW PROCESS FROM NODE   132.10 TO NODE   132.11 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  42.8 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  11.9
 UPSTREAM NODE ELEVATION =  1267.00
 DOWNSTREAM NODE ELEVATION =  1260.00
 FLOWLENGTH(FEET) =  1000.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    169.18
 TRAVEL TIME(MIN.) =   1.41    TC(MIN.) =  28.01


****************************************************************************
 FLOW PROCESS FROM NODE   600.10 TO NODE   132.11 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.810
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   27.00   SUBAREA RUNOFF(CFS) =   29.84
 EFFECTIVE AREA(ACRES) =  168.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  168.00
 PEAK FLOW RATE(CFS) =  185.69
 TC(MIN) =  28.01


****************************************************************************
 FLOW PROCESS FROM NODE   132.11 TO NODE   600.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  63.0 INCH PIPE IS  47.1 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  10.7
 UPSTREAM NODE ELEVATION =  1260.00
 DOWNSTREAM NODE ELEVATION =  1258.00
 FLOWLENGTH(FEET) =   400.00   MANNINGS N =  .013
```

```
 ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    185.69
 TRAVEL TIME(MIN.) =    .62    TC(MIN.) =  28.64

****************************************************************************
 FLOW PROCESS FROM NODE   600.01 TO NODE   600.02 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  51.0 INCH PIPE IS  37.9 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  16.4
 UPSTREAM NODE ELEVATION =  1258.00
 DOWNSTREAM NODE ELEVATION =  1240.00
 FLOWLENGTH(FEET) =  1150.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    185.69
 TRAVEL TIME(MIN.) =   1.17    TC(MIN.) =  29.80

****************************************************************************
 FLOW PROCESS FROM NODE   600.30 TO NODE   600.02 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.744
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   37.00   SUBAREA RUNOFF(CFS) =   38.70
 EFFECTIVE AREA(ACRES) =  205.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  205.00
 PEAK FLOW RATE(CFS) =  214.41
 TC(MIN) =  29.80

****************************************************************************
 FLOW PROCESS FROM NODE   600.02 TO NODE   600.03 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  54.0 INCH PIPE IS  38.8 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  17.5
 UPSTREAM NODE ELEVATION =  1240.00
 DOWNSTREAM NODE ELEVATION =  1215.00
 FLOWLENGTH(FEET) =  1500.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    214.41
 TRAVEL TIME(MIN.) =   1.43    TC(MIN.) =  31.23

****************************************************************************
 FLOW PROCESS FROM NODE   600.40 TO NODE   600.03 IS CODE =   8
```

```
------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.696
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   48.00   SUBAREA RUNOFF(CFS) =   48.12
 EFFECTIVE AREA(ACRES) =  253.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  253.00
 PEAK FLOW RATE(CFS) =  253.62
 TC(MIN) =  31.23


************************************************************************
 FLOW PROCESS FROM NODE   600.03 TO NODE   600.04 IS CODE =   3
------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  45.6 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  16.7
 UPSTREAM NODE ELEVATION =  1215.00
 DOWNSTREAM NODE ELEVATION =  1191.00
 FLOWLENGTH(FEET) =  1750.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   253.62
 TRAVEL TIME(MIN.) =   1.75    TC(MIN.) =  32.98


************************************************************************
 FLOW PROCESS FROM NODE   600.50 TO NODE   600.04 IS CODE =   8
------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.641
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   56.00   SUBAREA RUNOFF(CFS) =   53.39
 EFFECTIVE AREA(ACRES) =  309.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  309.00
 PEAK FLOW RATE(CFS) =  294.58
 TC(MIN) =  32.98


************************************************************************
 FLOW PROCESS FROM NODE   600.04 TO NODE   600.04 IS CODE =   1
------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
========================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  32.98
 RAINFALL INTENSITY (INCH./HOUR) =   1.64
 EFFECTIVE STREAM AREA(ACRES) =  309.00
```

```
 TOTAL STREAM AREA(ACRES) =  309.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    294.58
================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =    309.00
 EFFECTIVE AREA(ACRES) =    309.00
 PEAK FLOW RATE(CFS)    =    294.58
================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        Copyright 1983,86,87 Advanced Engineering Software (aes)
           Ver. 4.1C  Release Date: 5/11/87  Serial # I00908

                        Especially prepared for:

                          HALL & FOREMAN
 ************************* DESCRIPTION OF STUDY *************************
* FONTANA LINE T8 FOR 25 YR. STORM.                                     *
*                                                                       *
*                                                                       *
 *************************************************************************

  FILE NAME: WFONT8R.025
  TIME/DATE OF STUDY:  9:59   8/30/1989
=========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
=========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE =  .95
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =   .970
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   25.00   1-HOUR INTENSITY(INCH/HOUR) = 1.1461
  SLOPE OF INTENSITY DURATION CURVE =  .6000


**************************************************************************
  FLOW PROCESS FROM NODE   137.00 TO NODE   137.01 IS CODE =   2
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

  TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
  INITIAL SUBAREA FLOW-LENGTH =  1000.00
  UPSTREAM ELEVATION =   1375.00
  DOWNSTREAM ELEVATION =   1352.00
  ELEVATION DIFFERENCE =     23.00
  TC =  .412*[( 1000.00** 3.00)/(    23.00)]** .20 =   13.885
    25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.758
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
  SUBAREA RUNOFF(CFS) =     14.69
  TOTAL AREA(ACRES) =      7.50   PEAK FLOW RATE(CFS) =     14.69


**************************************************************************
  FLOW PROCESS FROM NODE   137.01 TO NODE   137.02 IS CODE =   5
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
```

```
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     14.69
 FLOW VELOCITY(FEET/SEC) =   4.23   FLOW DEPTH(FEET) =    .77
 TRAVEL TIME(MIN.) =   3.94   TC(MIN.) =  17.82

****************************************************************************
 FLOW PROCESS FROM NODE   137.10 TO NODE   137.02 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.374
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =    7.50   SUBAREA RUNOFF(CFS) =   12.10
 EFFECTIVE AREA(ACRES) =   15.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   15.00
 PEAK FLOW RATE(CFS) =   24.20
 TC(MIN) =  17.82

****************************************************************************
 FLOW PROCESS FROM NODE   137.02 TO NODE   132.12 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1335.00
 DOWNSTREAM NODE ELEVATION =   1323.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   630.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     24.20
 FLOW VELOCITY(FEET/SEC) =   5.17   FLOW DEPTH(FEET) =    .95
 TRAVEL TIME(MIN.) =   2.03   TC(MIN.) =  19.85

****************************************************************************
 FLOW PROCESS FROM NODE   137.20 TO NODE   132.12 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.226
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =    5.00   SUBAREA RUNOFF(CFS) =    7.40
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   20.00
 PEAK FLOW RATE(CFS) =   29.59
 TC(MIN) =  19.85

****************************************************************************
 FLOW PROCESS FROM NODE   132.12 TO NODE   137.10 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1323.00   DOWNSTREAM ELEVATION =   1321.00
 STREET LENGTH(FEET) =   320.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 20.00
```

```
 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   29.59
 ***STREET FLOWING FULL***
  STREETFLOW MODEL RESULTS:
      NOTE: STREETFLOW EXCEEDS TOP OF CURB.
      THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .69
      HALFSTREET FLOODWIDTH(FEET) =   20.00
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.97
      PRODUCT OF DEPTH&VELOCITY =    2.04
 STREETFLOW TRAVELTIME(MIN) =   1.80   TC(MIN) =  21.65

  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.113
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   20.00   PEAK FLOW RATE(CFS) =     29.59
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .69   HALFSTREET FLOODWIDTH(FEET) = 20.00
 FLOW VELOCITY(FEET/SEC.) =  2.97   DEPTH*VELOCITY =   2.04

****************************************************************************
 FLOW PROCESS FROM NODE   137.21 TO NODE   137.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.113
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   27.56
 EFFECTIVE AREA(ACRES) =   40.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   40.00
 PEAK FLOW RATE(CFS) =   55.11
 TC(MIN) =  21.65

****************************************************************************
 FLOW PROCESS FROM NODE   137.10 TO NODE   138.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.9 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   8.7
 UPSTREAM NODE ELEVATION =  1321.00
 DOWNSTREAM NODE ELEVATION =  1317.00
 FLOWLENGTH(FEET) =   630.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =     55.11
 TRAVEL TIME(MIN.) =   1.21    TC(MIN.) =  22.86

****************************************************************************
 FLOW PROCESS FROM NODE   138.00 TO NODE   138.10 IS CODE =   8
```

```
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   52.67
 EFFECTIVE AREA(ACRES) =   80.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   80.00
 PEAK FLOW RATE(CFS) =  105.34
 TC(MIN) =  22.86

****************************************************************************
 FLOW PROCESS FROM NODE   138.10 TO NODE   139.11 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  33.8 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  11.1
 UPSTREAM NODE ELEVATION =  1317.00
 DOWNSTREAM NODE ELEVATION =  1312.00
 FLOWLENGTH(FEET) =   630.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   105.34
 TRAVEL TIME(MIN.) =    .94   TC(MIN.) =  23.80

****************************************************************************
 FLOW PROCESS FROM NODE   139.20 TO NODE   139.11 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.996
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   50.91
 EFFECTIVE AREA(ACRES) =  120.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  120.00
 PEAK FLOW RATE(CFS) =  152.72
 TC(MIN) =  23.80

****************************************************************************
 FLOW PROCESS FROM NODE   139.11 TO NODE   132.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  34.5 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  15.8
 UPSTREAM NODE ELEVATION =  1312.00
 DOWNSTREAM NODE ELEVATION =  1269.00
 FLOWLENGTH(FEET) =  2720.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   152.72
 TRAVEL TIME(MIN.) =   2.87    TC(MIN.) =  26.67

****************************************************************************
 FLOW PROCESS FROM NODE   132.10 TO NODE   600.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
```

```
 UPSTREAM NODE ELEVATION =  1267.00
 DOWNSTREAM NODE ELEVATION =  1258.00
 FLOWLENGTH(FEET) =  1400.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   152.72
 TRAVEL TIME(MIN.) =   2.12    TC(MIN.) =  28.79

****************************************************************************
 FLOW PROCESS FROM NODE   600.01 TO NODE   600.02 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  34.7 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  15.7
 UPSTREAM NODE ELEVATION =  1258.00
 DOWNSTREAM NODE ELEVATION =  1240.00
 FLOWLENGTH(FEET) =  1150.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   152.72
 TRAVEL TIME(MIN.) =   1.22    TC(MIN.) =  30.01

****************************************************************************
 FLOW PROCESS FROM NODE   600.30 TO NODE   600.02 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.737
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   37.00   SUBAREA RUNOFF(CFS) =   38.45
 EFFECTIVE AREA(ACRES) =  157.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  157.00
 PEAK FLOW RATE(CFS) =  163.17
 TC(MIN) =  30.01

****************************************************************************
 FLOW PROCESS FROM NODE   600.02 TO NODE   600.03 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  35.7 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  16.3
 UPSTREAM NODE ELEVATION =  1240.00
 DOWNSTREAM NODE ELEVATION =  1215.00
 FLOWLENGTH(FEET) =  1500.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   163.17
 TRAVEL TIME(MIN.) =   1.54    TC(MIN.) =  31.55

****************************************************************************
 FLOW PROCESS FROM NODE   600.40 TO NODE   600.03 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.686
```

```
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =  205.00
 PEAK FLOW RATE(CFS) =  203.60
 TC(MIN) =  31.55


****************************************************************************
 FLOW PROCESS FROM NODE   600.03 TO NODE   600.04 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  54.0 INCH PIPE IS  40.2 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  16.0
 UPSTREAM NODE ELEVATION =  1215.00
 DOWNSTREAM NODE ELEVATION =  1190.90
 FLOWLENGTH(FEET) =  1750.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    203.60
 TRAVEL TIME(MIN.) =   1.82    TC(MIN.) =  33.37


****************************************************************************
 FLOW PROCESS FROM NODE   600.50 TO NODE   600.04 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   25 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.630
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   56.00   SUBAREA RUNOFF(CFS) =   52.81
 EFFECTIVE AREA(ACRES) =  261.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =  261.00
 PEAK FLOW RATE(CFS) =  246.11
 TC(MIN) =  33.37


****************************************************************************
 FLOW PROCESS FROM NODE   600.04 TO NODE   600.04 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  33.37
 RAINFALL INTENSITY (INCH./HOUR) =   1.63
 EFFECTIVE STREAM AREA(ACRES) =  261.00
 TOTAL STREAM AREA(ACRES) =  261.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    246.11
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =    261.00
 EFFECTIVE AREA(ACRES) =    261.00
 PEAK FLOW RATE(CFS)    =    246.11
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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           Ver. 4.1C  Release Date: 5/11/87  Serial # I00908

                        Especially prepared for:

                             HALL & FOREMAN
 ************************** DESCRIPTION OF STUDY **********************
* N.FONTANA MASTER S.D LINE T-8, DOES NOT INCLUDE OVERFLOW FORM BASELin
* Q 100 YR, NOT DESIGN Q
* VENKI.N, JN 3547, REVISION REQUESTED BY CITY AND COUNTY
 **************************************************************************

  FILE NAME: A:WFONT8R.100
  TIME/DATE OF STUDY:  8:56   7/11/1990
==========================================================================
  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 =
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =   .970
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) = 1.4700
  SLOPE OF INTENSITY DURATION CURVE =  .6000


**************************************************************************
  FLOW PROCESS FROM NODE   137.00 TO NODE   137.01 IS CODE =   2
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

  TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
  INITIAL SUBAREA FLOW-LENGTH =  1000.00
  UPSTREAM ELEVATION =   1375.00
  DOWNSTREAM ELEVATION =   1352.00
  ELEVATION DIFFERENCE =     23.00
  TC =  .412*[( 1000.00** 3.00)/(    23.00)]** .20 =   13.885
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.537
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA RUNOFF(CFS) =     19.95
  TOTAL AREA(ACRES) =      7.50   PEAK FLOW RATE(CFS) =     19.95
```

```
**********************************************************************
 FLOW PROCESS FROM NODE   137.01 TO NODE   137.02 IS CODE =   5
----------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
======================================================================
 UPSTREAM NODE ELEVATION =   1352.00
 DOWNSTREAM NODE ELEVATION =   1335.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     19.95
 FLOW VELOCITY(FEET/SEC) =   4.68   FLOW DEPTH(FEET) =    .89
 TRAVEL TIME(MIN.) =   3.56   TC(MIN.) =  17.44


**********************************************************************
 FLOW PROCESS FROM NODE   137.10 TO NODE   137.02 IS CODE =   8
----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.085
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =    7.50   SUBAREA RUNOFF(CFS) =   16.89
 EFFECTIVE AREA(ACRES) =   15.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   15.00
 PEAK FLOW RATE(CFS) =   33.79
 TC(MIN) =  17.44


**********************************************************************
 FLOW PROCESS FROM NODE   137.02 TO NODE   132.12 IS CODE =   5
----------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
======================================================================
 UPSTREAM NODE ELEVATION =   1335.00
 DOWNSTREAM NODE ELEVATION =   1323.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   630.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     33.79
 FLOW VELOCITY(FEET/SEC) =   5.61   FLOW DEPTH(FEET) =   1.14
 TRAVEL TIME(MIN.) =   1.87   TC(MIN.) =  19.31


**********************************************************************
 FLOW PROCESS FROM NODE   137.20 TO NODE   132.12 IS CODE =   8
----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.902
 SOIL CLASSIFICATION IS "A"
```

```
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     5.00   SUBAREA RUNOFF(CFS) =   10.44
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =    20.00
 PEAK FLOW RATE(CFS) =   41.76
 TC(MIN) =  19.31


****************************************************************************
 FLOW PROCESS FROM NODE    132.12 TO NODE    137.10 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =    1323.00   DOWNSTREAM ELEVATION =    1321.00
 STREET LENGTH(FEET) =    320.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
 INTERIOR STREET CROSSFALL(DECIMAL) =    .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =    .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

       **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =    41.76
 ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS:
       NOTE: STREETFLOW EXCEEDS TOP OF CURB.
       THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =    .75
       HALFSTREET FLOODWIDTH(FEET) =   20.00
       AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.39
       PRODUCT OF DEPTH&VELOCITY =    2.53
 STREETFLOW TRAVELTIME(MIN) =   1.57   TC(MIN) =  20.89

  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.769
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =      .00   SUBAREA RUNOFF(CFS) =      .00
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =    20.00   PEAK FLOW RATE(CFS) =     41.76
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .75   HALFSTREET FLOODWIDTH(FEET) = 20.00
 FLOW VELOCITY(FEET/SEC.) =  3.39   DEPTH*VELOCITY =   2.53


****************************************************************************
 FLOW PROCESS FROM NODE    137.21 TO NODE    137.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.769
```

```
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   39.36
 EFFECTIVE AREA(ACRES) =   40.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   40.00
 PEAK FLOW RATE(CFS) =   78.72
 TC(MIN) =  20.89


****************************************************************************
 FLOW PROCESS FROM NODE   137.10 TO NODE   138.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  45.0 INCH PIPE IS  31.5 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   9.5
 UPSTREAM NODE ELEVATION =  1321.00
 DOWNSTREAM NODE ELEVATION =  1317.00
 FLOWLENGTH(FEET) =   630.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    78.72
 TRAVEL TIME(MIN.) =   1.10    TC(MIN.) =  21.99


****************************************************************************
 FLOW PROCESS FROM NODE   138.00 TO NODE   138.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.685
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   75.69
 EFFECTIVE AREA(ACRES) =   80.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   80.00
 PEAK FLOW RATE(CFS) =  151.38
 TC(MIN) =  21.99


****************************************************************************
 FLOW PROCESS FROM NODE   138.10 TO NODE   139.11 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  54.0 INCH PIPE IS  39.6 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  12.1
 UPSTREAM NODE ELEVATION =  1317.00
 DOWNSTREAM NODE ELEVATION =  1312.00
 FLOWLENGTH(FEET) =   630.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   151.38
```

```
 TRAVEL TIME(MIN.) =     .87    TC(MIN.) =  22.86

****************************************************************************
 FLOW PROCESS FROM NODE   139.20 TO NODE   139.11 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.623
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   73.48
 EFFECTIVE AREA(ACRES) =  120.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  120.00
 PEAK FLOW RATE(CFS) =  220.44
 TC(MIN) =  22.86


****************************************************************************
 FLOW PROCESS FROM NODE   139.11 TO NODE   139.12 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  54.0 INCH PIPE IS  40.8 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  17.1
 UPSTREAM NODE ELEVATION =  1312.00
 DOWNSTREAM NODE ELEVATION =  1287.00
 FLOWLENGTH(FEET) =  1600.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   220.44
 TRAVEL TIME(MIN.) =   1.56    TC(MIN.) =  24.42


****************************************************************************
 FLOW PROCESS FROM NODE   509.00 TO NODE   139.12 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.521
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   21.00   SUBAREA RUNOFF(CFS) =   36.65
 EFFECTIVE AREA(ACRES) =  141.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  141.00
 PEAK FLOW RATE(CFS) =  246.08
 TC(MIN) =  24.42


****************************************************************************
 FLOW PROCESS FROM NODE   139.12 TO NODE   132.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  42.5 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =  18.3
  UPSTREAM NODE ELEVATION =  1287.00
  DOWNSTREAM NODE ELEVATION =  1267.00
  FLOWLENGTH(FEET) =  1120.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    246.08
  TRAVEL TIME(MIN.) =   1.02    TC(MIN.) =  25.43


****************************************************************************
  FLOW PROCESS FROM NODE   132.10 TO NODE   132.11 IS CODE =   3
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  48.9 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =  13.0
  UPSTREAM NODE ELEVATION =  1267.00
  DOWNSTREAM NODE ELEVATION =  1260.00
  FLOWLENGTH(FEET) =  1000.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    246.08
  TRAVEL TIME(MIN.) =   1.28    TC(MIN.) =  26.71


****************************************************************************
  FLOW PROCESS FROM NODE   600.10 TO NODE   132.11 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.389
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   27.00   SUBAREA RUNOFF(CFS) =   43.91
  EFFECTIVE AREA(ACRES) =  168.00
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =  168.00
  PEAK FLOW RATE(CFS) =  273.19
  TC(MIN) =  26.71


****************************************************************************
  FLOW PROCESS FROM NODE   132.11 TO NODE   600.10 IS CODE =   3
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  55.3 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =  11.7
  UPSTREAM NODE ELEVATION =  1260.00
  DOWNSTREAM NODE ELEVATION =  1258.00
  FLOWLENGTH(FEET) =   400.00   MANNINGS N =  .013
```

```
 ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    273.19
 TRAVEL TIME(MIN.) =    .57    TC(MIN.) =  27.28

****************************************************************
 FLOW PROCESS FROM NODE   600.01 TO NODE   600.02 IS CODE =   3
----------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  46.0 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  17.8
 UPSTREAM NODE ELEVATION =  1258.00
 DOWNSTREAM NODE ELEVATION =  1240.00
 FLOWLENGTH(FEET) =  1150.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    273.19
 TRAVEL TIME(MIN.) =   1.08    TC(MIN.) =  28.36

****************************************************************
 FLOW PROCESS FROM NODE   600.30 TO NODE   600.02 IS CODE =   8
----------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.305
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   37.00   SUBAREA RUNOFF(CFS) =   57.37
 EFFECTIVE AREA(ACRES) =  205.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  205.00
 PEAK FLOW RATE(CFS) =  317.85
 TC(MIN) =  28.36

****************************************************************
 FLOW PROCESS FROM NODE   600.02 TO NODE   600.03 IS CODE =   3
----------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  47.6 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  19.0
 UPSTREAM NODE ELEVATION =  1240.00
 DOWNSTREAM NODE ELEVATION =  1215.00
 FLOWLENGTH(FEET) =  1500.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    317.85
 TRAVEL TIME(MIN.) =   1.31    TC(MIN.) =  29.67

****************************************************************
 FLOW PROCESS FROM NODE   600.40 TO NODE   600.03 IS CODE =   8
```

```
------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.243
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   48.00   SUBAREA RUNOFF(CFS) =   71.75
 EFFECTIVE AREA(ACRES) =  253.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  253.00
 PEAK FLOW RATE(CFS) =  378.19
 TC(MIN) =  29.67


************************************************************************
 FLOW PROCESS FROM NODE   600.03 TO NODE   600.04 IS CODE =   3
------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
 DEPTH OF FLOW IN  66.0 INCH PIPE IS  53.3 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  18.4
 UPSTREAM NODE ELEVATION =  1215.00
 DOWNSTREAM NODE ELEVATION =  1191.00
 FLOWLENGTH(FEET) =  1750.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   378.19
 TRAVEL TIME(MIN.) =   1.59    TC(MIN.) =  31.26


************************************************************************
 FLOW PROCESS FROM NODE   600.50 TO NODE   600.04 IS CODE =   8
------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.174
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   56.00   SUBAREA RUNOFF(CFS) =   80.23
 EFFECTIVE AREA(ACRES) =  309.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  309.00
 PEAK FLOW RATE(CFS) =  442.72
 TC(MIN) =  31.26


************************************************************************
 FLOW PROCESS FROM NODE   600.04 TO NODE   600.04 IS CODE =   1
------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
========================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  31.26
 RAINFALL INTENSITY (INCH./HOUR) =   2.17
 EFFECTIVE STREAM AREA(ACRES) =  309.00
```

```
 TOTAL STREAM AREA(ACRES) =  309.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    442.72
================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =    309.00
 EFFECTIVE AREA(ACRES) =    309.00
 PEAK FLOW RATE(CFS)    =    442.72
================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        Copyright 1983,86,87 Advanced Engineering Software (aes)
           Ver. 4.1C  Release Date: 5/11/87  Serial # I00908

                        Especially prepared for:

                          HALL & FOREMAN
************************** DESCRIPTION OF STUDY **************************
* N. FONTANA MASTER S.D. PLAN, W.FONTANA CHANNEL LATERAL 6.               *
* Q 100-YR., DESIGN Q FOR W. FONTANA CHANNEL ONLY.                        *
* JN 3547, T. ARROYO, 11/28/89.                                          *
**************************************************************************

 FILE NAME: WFONT6R.100
 TIME/DATE OF STUDY: 15:22  11/29/1989
==========================================================================
 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 =  .95
 *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
 10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =   .970
 100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
 COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) = 1.4700
 SLOPE OF INTENSITY DURATION CURVE =  .6000


**************************************************************************
 FLOW PROCESS FROM NODE   454.00 TO NODE   454.10 IS CODE =   2
--------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
 DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH =  1000.00
 UPSTREAM ELEVATION =   1266.00
```

```
DOWNSTREAM ELEVATION =    1249.00
ELEVATION DIFFERENCE =      17.00
TC =  .412*[( 1000.00** 3.00)/(    17.00)]** .20 =    14.751
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.411
SOIL CLASSIFICATION IS "A"
 ESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =   .5820
 JBAREA RUNOFF(CFS) =      25.46
TOTAL AREA(ACRES) =      10.00   PEAK FLOW RATE(CFS) =      25.46

****************************************************************************
FLOW PROCESS FROM NODE    454.10 TO NODE    455.21 IS CODE =    6
----------------------------------------------------------------------------
>>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
UPSTREAM ELEVATION =    1249.00    DOWNSTREAM ELEVATION =    1247.30
STREET LENGTH(FEET) =    350.00    CURB HEIGTH(INCHES) = 8.
STREET HALFWIDTH(FEET) = 36.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  24.00
INTERIOR STREET CROSSFALL(DECIMAL) =    .020
OUTSIDE STREET CROSSFALL(DECIMAL)  =    .040

SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =    25.46
  STREETFLOW MODEL RESULTS:
      NOTE: STREETFLOW EXCEEDS TOP OF CURB.
      THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =    .71
      HALFSTREET FLOODWIDTH(FEET) =    17.62
      AVERAGE FLOW VELOCITY(FEET/SEC.) =     2.71
      PRODUCT OF DEPTH&VELOCITY =     1.93
STREETFLOW TRAVELTIME(MIN) =    2.15   TC(MIN) =  16.90

 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.144
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =   .5820
SUBAREA AREA(ACRES) =      .00   SUBAREA RUNOFF(CFS) =      .00
EFFECTIVE AREA(ACRES) =   10.00
AVERAGED Fm(INCH/HR) =    .582
TOTAL AREA(ACRES) =    10.00   PEAK FLOW RATE(CFS) =      25.46
END OF SUBAREA STREETFLOW HYDRAULICS:
DEPTH(FEET) =  .71   HALFSTREET FLOODWIDTH(FEET) = 17.62
FLOW VELOCITY(FEET/SEC.) =  2.71   DEPTH*VELOCITY =   1.93

****************************************************************************
FLOW PROCESS FROM NODE    455.00 TO NODE    455.21 IS CODE =    8
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.144
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =   .5820
SUBAREA AREA(ACRES) =    10.00   SUBAREA RUNOFF(CFS) =    23.06
EFFECTIVE AREA(ACRES) =   20.00
AVERAGED Fm(INCH/HR) =    .582
TOTAL AREA(ACRES) =   20.00
 EAK FLOW RATE(CFS) =   46.11
 (MIN) =  16.90

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

```
 FLOW PROCESS FROM NODE    455.21 TO NODE    456.01 IS CODE =    3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  29.1 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   6.9
 UPSTREAM NODE ELEVATION =  1247.30
 DOWNSTREAM NODE ELEVATION =  1245.00
 FLOWLENGTH(FEET) =   575.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    46.11
 TRAVEL TIME(MIN.) =   1.38    TC(MIN.) =  18.28

****************************************************************************
 FLOW PROCESS FROM NODE    456.00 TO NODE    456.01 IS CODE =    8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.999
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   43.51
 EFFECTIVE AREA(ACRES) =   40.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   40.00
 PEAK FLOW RATE(CFS) =   87.02
 TC(MIN) =  18.28

****************************************************************************
 FLOW PROCESS FROM NODE    456.01 TO NODE    457.01 IS CODE =    3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  51.0 INCH PIPE IS  37.6 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   7.8
 UPSTREAM NODE ELEVATION =  1245.00
 DOWNSTREAM NODE ELEVATION =  1242.80
 FLOWLENGTH(FEET) =   630.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    87.02
 TRAVEL TIME(MIN.) =   1.35    TC(MIN.) =  19.64

****************************************************************************
 FLOW PROCESS FROM NODE    457.00 TO NODE    457.01 IS CODE =    8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.873
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
 SUBAREA AREA(ACRES) =   28.00   SUBAREA RUNOFF(CFS) =   57.74
 EFFECTIVE AREA(ACRES) =   68.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   68.00
 PEAK FLOW RATE(CFS) =  140.23
 TC(MIN) =  19.64

****************************************************************************
 FLOW PROCESS FROM NODE    457.01 TO NODE    455.10 IS CODE =    3
----------------------------------------------------------------------------
```

```
>>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
DEPTH OF FLOW IN  57.0 INCH PIPE IS  41.9 INCHES
PIPEFLOW VELOCITY(FEET/SEC.) =  10.0
UPSTREAM NODE ELEVATION =  1242.80
DOWNSTREAM NODE ELEVATION =  1239.00
FLOWLENGTH(FEET) =  750.00   MANNINGS N =  .013
ESTIMATED PIPE DIAMETER(INCH) =  57.00   NUMBER OF PIPES =  1
PIPEFLOW THRU SUBAREA(CFS) =  140.23
TRAVEL TIME(MIN.) =  1.24   TC(MIN.) =  20.88

****************************************************************************
FLOW PROCESS FROM NODE   457.10 TO NODE   455.10 IS CODE =  8
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.769
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
SUBAREA AREA(ACRES) =  40.00   SUBAREA RUNOFF(CFS) =  78.74
EFFECTIVE AREA(ACRES) =  108.00
AVERAGED Fm(INCH/HR) =  .582
TOTAL AREA(ACRES) =  108.00
PEAK FLOW RATE(CFS) =  212.61
TC(MIN) =  20.88

****************************************************************************
FLOW PROCESS FROM NODE   455.10 TO NODE   458.10 IS CODE =  3
----------------------------------------------------------------------------
>>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
DEPTH OF FLOW IN  57.0 INCH PIPE IS  45.5 INCHES
PIPEFLOW VELOCITY(FEET/SEC.) =  14.0
UPSTREAM NODE ELEVATION =  1239.00
DOWNSTREAM NODE ELEVATION =  1223.00
FLOWLENGTH(FEET) =  1650.00   MANNINGS N =  .013
ESTIMATED PIPE DIAMETER(INCH) =  57.00   NUMBER OF PIPES =  1
PIPEFLOW THRU SUBAREA(CFS) =  212.61
TRAVEL TIME(MIN.) =  1.96   TC(MIN.) =  22.84

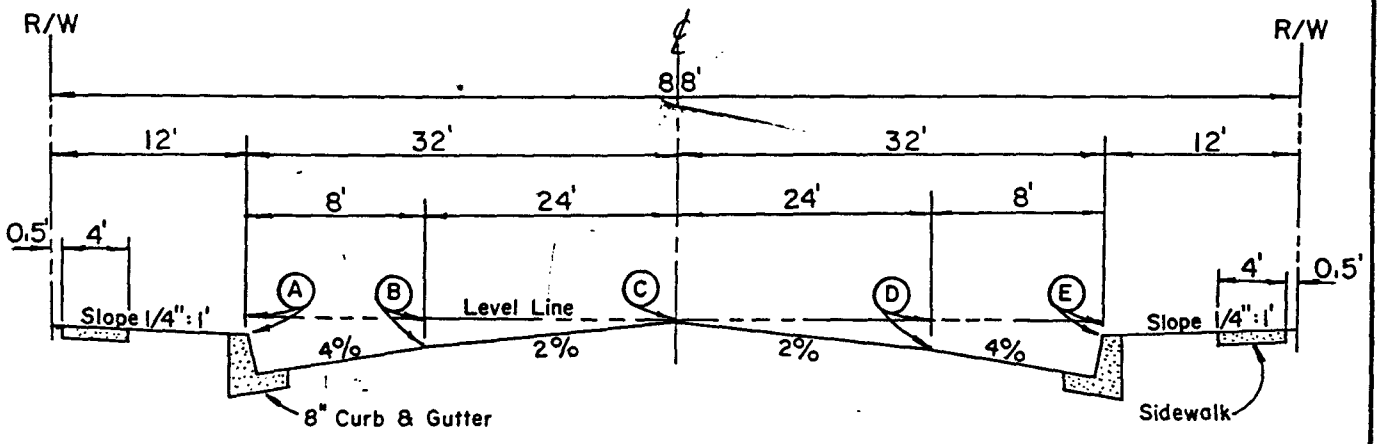
****************************************************************************
FLOW PROCESS FROM NODE   458.00 TO NODE   458.10 IS CODE =  8
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.624
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5820
SUBAREA AREA(ACRES) =  78.00   SUBAREA RUNOFF(CFS) =  143.36
EFFECTIVE AREA(ACRES) =  186.00
AVERAGED Fm(INCH/HR) =  .582
TOTAL AREA(ACRES) =  186.00
PEAK FLOW RATE(CFS) =  341.85
TC(MIN) =  22.84

****************************************************************************
FLOW PROCESS FROM NODE   458.10 TO NODE   458.10 IS CODE =  1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
```

```
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MINUTES) =  22.84
RAINFALL INTENSITY (INCH./HOUR) =   2.62
EFFECTIVE STREAM AREA(ACRES) =  186.00
TOTAL STREAM AREA(ACRES) =  186.00
PEAK FLOW RATE(CFS) AT CONFLUENCE =    341.85
================================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)      =    186.00
EFFECTIVE AREA(ACRES) =    186.00
PEAK FLOW RATE(CFS)    =    341.85
================================================================================
END OF RATIONAL METHOD ANALYSIS
```

BEECH, FOOTHILL, ARROW & CITRUS

1.6% = 129 CFS



LEVEL SECTION
SECONDARY HIGHWAY

SECONDARY HIGHWAY

SECTION	A	B	C	D	E
~~TILTED~~	~~-.86~~	~~-1.03~~	~~-.19~~	~~-.43~~	~~0.00~~
LEVEL	-.18	-.48	0.00	-.48	-.18

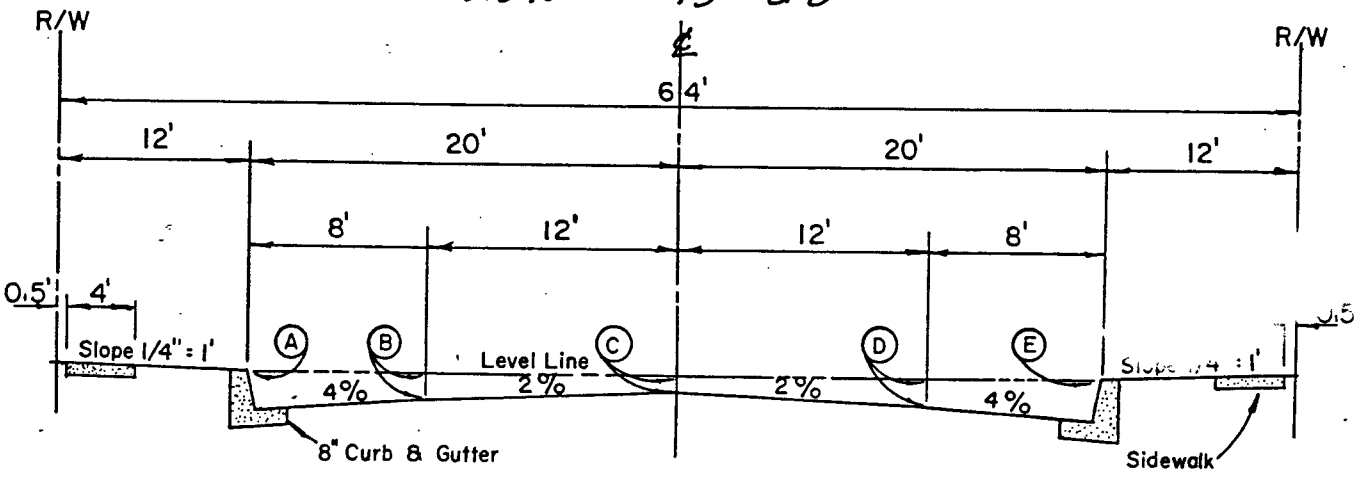
CITY OF FONTANA, CALIFORNIA
SECONDARY HIGHWAY
TYPICAL SECTION
Not To Scale

Drawn By C. Navarro
Checked By
Approved
CITY ENGINEER
Date 7-13-76

STD. DETAIL 100-B

CYPRESS, JUNIPER, OLEANDER & MILLER

1.8% = 135.57 CFS
1.7% = 131.75 CFS
1.6% = 127.81 CFS
0.5% = 73 CFS



LEVEL SECTION
COLLECTOR STREET

COLLECTOR STREETS

SECTION	A	B	C	D	E
~~TILTED~~	~~.62~~	~~.79'~~	~~.31'~~	~~.43'~~	~~0.00'~~
LEVEL	0.00'	-.30	-.06	-.30	0.00'

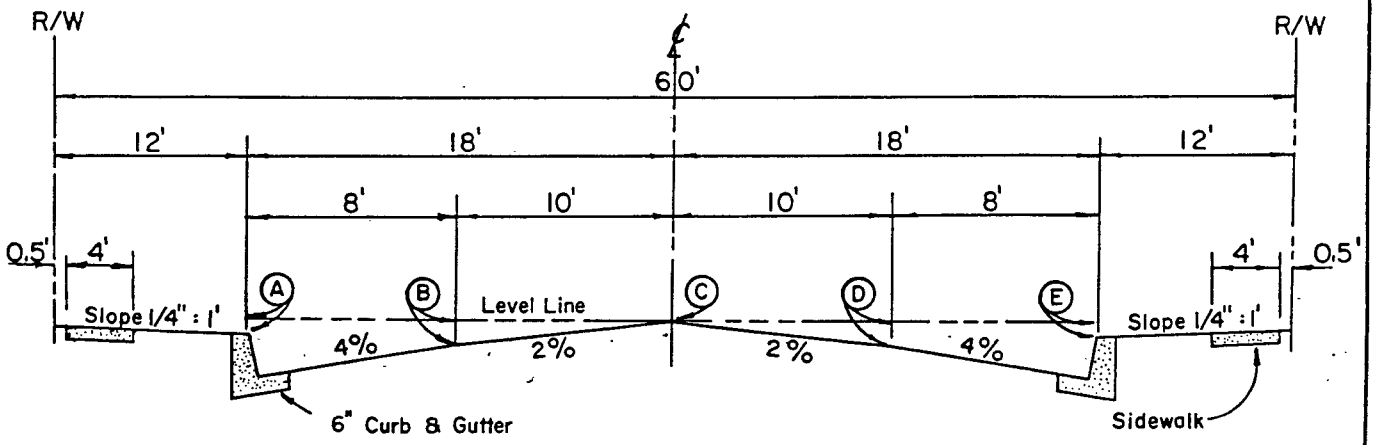
CITY OF FONTANA, CALIFORNIA
COLLECTOR STREETS
TYPICAL SECTION
Not To Scale

Drawn By C. Navarro
Checked By [signature]
Approved [signature] CITY ENGINEER
Date 7-13-76

STD. DETAIL 100-C

SULTANA

1.6% = 127.8 CFS
1.5% = 123.76 CFS
0.5% = 73 CFS



LEVEL SECTION
LOCAL STREET

LOCAL STREETS

SECTION	A	B	C	D	E
~~TILTED~~	~~.56~~	~~.56~~	~~.16~~	~~.26~~	~~0.00~~
LEVEL	-.07	-.20	0.00	-.20	-.07

CITY OF FONTANA, CALIFORNIA
LOCAL STREETS
TYPICAL SECTION

Not To Scale

Drawn By C. Navarro
Checked By
Approved
CITY ENGINEER
Date 7-13-76

STD. DETAIL 100-D

```
**********************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        Copyright 1983,86,87 Advanced Engineering Software (aes)
          Ver. 4.1C  Release Date: 5/11/87  Serial # I00908

                        Especially prepared for:

                             HALL & FOREMAN
 ************************** DESCRIPTION OF STUDY **********************
* N. FONTANA MASTER S.D. PLAN, WEST FONTNA CHANNEL
* Q 100 YEAR, DESIGN Q
* JN 3547
 **********************************************************************

  FILE NAME: WFONCHLR.DES
  TIME/DATE OF STUDY:  1:38   1/ 1/1980
======================================================================
  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 =
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =   .970
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) = 1.4700
  SLOPE OF INTENSITY DURATION CURVE =  .6000


**********************************************************************
  FLOW PROCESS FROM NODE   108.33 TO NODE   108.33 IS CODE =   7
----------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
======================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:                  FROM
  TC(MIN) =  22.44   RAIN INTENSITY(INCH/HOUR) =  2.65   DATA
  EFFECTIVE AREA(ACRES) =   247.89                       FOR
  TOTAL AREA(ACRES) =   288.00   PEAK FLOW RATE(CFS) =    474.14
  AVERAGED LOSS RATE, Fm(IN/HR) =   .580          WFONTIR.100
                                                    'I-1"
**********************************************************************
  FLOW PROCESS FROM NODE   108.33 TO NODE   108.34 IS CODE =   3
----------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
======================================================================
  DEPTH OF FLOW IN 102.0 INCH PIPE IS  77.8 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =  10.2
```

```
  UPSTREAM NODE ELEVATION =  1241.00
  DOWNSTREAM NODE ELEVATION =  1239.50
  FLOWLENGTH(FEET) =   630.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) = 102.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    474.14
  TRAVEL TIME(MIN.) =   1.03    TC(MIN.) =  23.47

****************************************************************************
  FLOW PROCESS FROM NODE   108.34 TO NODE   109.40 IS CODE =   5
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION =   1239.50
  DOWNSTREAM NODE ELEVATION =   1239.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   620.00
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =    .000
  MANNINGS FACTOR =  .014   MAXIMUM DEPTH(FEET) =   5.00
  CHANNEL FLOW THRU SUBAREA(CFS) =    474.14
  FLOW VELOCITY(FEET/SEC) =   6.04   FLOW DEPTH(FEET) =   3.93
  TRAVEL TIME(MIN.) =   1.71   TC(MIN.) =  25.18

****************************************************************************
  FLOW PROCESS FROM NODE   109.40 TO NODE   109.40 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MINUTES) =  25.18
  RAINFALL INTENSITY (INCH./HOUR) =   2.48
  EFFECTIVE STREAM AREA(ACRES) =  247.89
  TOTAL STREAM AREA(ACRES) =  288.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    474.14

****************************************************************************
  FLOW PROCESS FROM NODE   109.40 TO NODE   109.40 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:                    DATA FROM
  TC(MIN) =  28.54   RAIN INTENSITY(INCH/HOUR) =  2.30     WFONCHL2.DE
  EFFECTIVE AREA(ACRES) =   463.99
  TOTAL AREA(ACRES) =   511.96   PEAK FLOW RATE(CFS) =    715.65
  AVERAGED LOSS RATE, Fm(IN/HR) =   .582                   "T-2"
  ***ERROR; SPECIFIED LOSS RATE, FM IS LESS THAN MINIMUM
            POSSIBLE VALUE OF   .58(INCHES/HOUR)

****************************************************************************
  FLOW PROCESS FROM NODE   109.40 TO NODE   109.40 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MINUTES) =  28.54
  RAINFALL INTENSITY (INCH./HOUR) =   2.30
  EFFECTIVE STREAM AREA(ACRES) =  463.99
  TOTAL STREAM AREA(ACRES) =  511.96
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    715.65

  CONFLUENCE INFORMATION:
  STREAM    PEAK FLOW    TIME    INTENSITY     FM     EFFECTIVE
  NUMBER    RATE(CFS)   (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
--------------------------------------------------------------------
    1       474.14      25.18       2.475      .58       247.89
    2       715.65      28.54       2.296      .58       463.99

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.
  SUMMARY RESULTS:
  STREAM    CONFLUENCE    EFFECTIVE
  NUMBER      Q(CFS)     AREA(ACRES)
-----------------------------------------------
    1      1171.55        657.25
    2      1144.96        711.88
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =   1171.55   TIME(MINUTES) =   25.180
  EFFECTIVE AREA(ACRES) =    657.25
  TOTAL AREA(ACRES) =    799.96


****************************************************************************
  FLOW PROCESS FROM NODE   109.40 TO NODE  1505.10 IS CODE =   5
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION =   1239.00
  DOWNSTREAM NODE ELEVATION =   1236.70
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1315.00
  CHANNEL BASE(FEET) =   25.00   "Z" FACTOR =    .000
  MANNINGS FACTOR =  .014   MAXIMUM DEPTH(FEET) =   6.00
  CHANNEL FLOW THRU SUBAREA(CFS) =   1171.55
  FLOW VELOCITY(FEET/SEC) =  10.02   FLOW DEPTH(FEET) =   4.68
  TRAVEL TIME(MIN.) =   2.19   TC(MIN.) =  27.37


****************************************************************************
  FLOW PROCESS FROM NODE  1505.10 TO NODE  1505.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MINUTES) =  27.37
  RAINFALL INTENSITY (INCH./HOUR) =   2.35
  EFFECTIVE STREAM AREA(ACRES) =  657.25
```

```
 TOTAL STREAM AREA(ACRES) =  799.96
 PEAK FLOW RATE(CFS) AT CONFLUENCE =   1171.55

****************************************************************************
 FLOW PROCESS FROM NODE  1505.10 TO NODE  1505.10 IS CODE =   7
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:                          FROM DATA
 TC(MIN) =  25.12   RAIN INTENSITY(INCH/HOUR) =  2.48           FOR
 EFFECTIVE AREA(ACRES) =   320.70
 TOTAL AREA(ACRES) =   342.30   PEAK FLOW RATE(CFS) =   547.42
 AVERAGED LOSS RATE, Fm(IN/HR) =   .582                  WFONCHL3.DE
                                                           'T-3"
****************************************************************************
 FLOW PROCESS FROM NODE  1505.10 TO NODE  1505.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MINUTES) =  25.12
 RAINFALL INTENSITY (INCH./HOUR) =   2.48
 EFFECTIVE STREAM AREA(ACRES) =  320.70
 TOTAL STREAM AREA(ACRES) =  342.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    547.42

 CONFLUENCE INFORMATION:
 STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
 NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
----------------------------------------------------------------------------
   1     1171.55     27.37       2.354     .58      657.25
   2      547.42     25.12       2.479     .58      320.70

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.
 SUMMARY RESULTS:
 STREAM   CONFLUENCE   EFFECTIVE
 NUMBER     Q(CFS)    AREA(ACRES)
-------------------------------------------
   1     1683.13       977.95
   2     1698.10       924.00
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =   1698.10   TIME(MINUTES) =   25.120
 EFFECTIVE AREA(ACRES) =    924.00
 TOTAL AREA(ACRES) =   1142.26

****************************************************************************
 FLOW PROCESS FROM NODE  1505.10 TO NODE   114.40 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
```

```
==========================================================================
  UPSTREAM NODE ELEVATION =    1236.70
  DOWNSTREAM NODE ELEVATION =    1226.30
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1425.00
  CHANNEL BASE(FEET) =    25.00    "Z" FACTOR =     .000
  MANNINGS FACTOR =  .013    MAXIMUM DEPTH(FEET) =    5.00
  CHANNEL FLOW THRU SUBAREA(CFS) =    1698.10
  FLOW VELOCITY(FEET/SEC) =  19.21    FLOW DEPTH(FEET) =    3.54
  TRAVEL TIME(MIN.) =    1.24    TC(MIN.) =  26.36


****************************************************************************
  FLOW PROCESS FROM NODE    114.40 TO NODE    114.40 IS CODE =    1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MINUTES) =  26.36
  RAINFALL INTENSITY (INCH./HOUR) =    2.41
  EFFECTIVE STREAM AREA(ACRES) =  924.00
  TOTAL STREAM AREA(ACRES) = 1142.26
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    1698.10


****************************************************************************
  FLOW PROCESS FROM NODE    114.40 TO NODE    114.40 IS CODE =    7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:                    DATA FROM
  TC(MIN) =  28.42    RAIN INTENSITY(INCH/HOUR) =  2.30
  EFFECTIVE AREA(ACRES) =    380.65
  TOTAL AREA(ACRES) =    397.15    PEAK FLOW RATE(CFS) =     589.63
  AVERAGED LOSS RATE, Fm(IN/HR) =    .582                  WFONT4R2.DE
                                                              "T-4"

****************************************************************************
  FLOW PROCESS FROM NODE    114.40 TO NODE    114.40 IS CODE =    1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MINUTES) =  28.42
  RAINFALL INTENSITY (INCH./HOUR) =    2.30
  EFFECTIVE STREAM AREA(ACRES) =  380.65
  TOTAL STREAM AREA(ACRES) =  397.15
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     589.63

  CONFLUENCE INFORMATION:
  STREAM    PEAK FLOW    TIME    INTENSITY     FM     EFFECTIVE
  NUMBER    RATE(CFS)   (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
----------------------------------------------------------------------------
    1      1698.10      26.36       2.408      .58       924.00
    2       589.63      28.42       2.302      .58       380.65
```

```
 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.
 SUMMARY RESULTS:
 STREAM    CONFLUENCE    EFFECTIVE
 NUMBER      Q(CFS)     AREA(ACRES)
-----------------------------------------
    1      2278.78       1277.00
    2      2188.72       1304.65
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =   2278.78   TIME(MINUTES) =   26.356
 EFFECTIVE AREA(ACRES) =   1277.00
 TOTAL AREA(ACRES) =   1539.41


****************************************************************************
 FLOW PROCESS FROM NODE   114.40 TO NODE   456.10 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1226.40
 DOWNSTREAM NODE ELEVATION =   1223.30
 CHANNEL LENGTH THRU SUBAREA(FEET) =   620.00
 CHANNEL BASE(FEET) =   35.00   "Z" FACTOR =    .000
 MANNINGS FACTOR =  .014   MAXIMUM DEPTH(FEET) =   5.00
 CHANNEL FLOW THRU SUBAREA(CFS) =   2278.78
 FLOW VELOCITY(FEET/SEC) =  16.42   FLOW DEPTH(FEET) =   3.96
 TRAVEL TIME(MIN.) =    .63   TC(MIN.) =  26.99


****************************************************************************
 FLOW PROCESS FROM NODE   456.10 TO NODE   456.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  26.99
 RAINFALL INTENSITY (INCH./HOUR) =   2.37
 EFFECTIVE STREAM AREA(ACRES) = 1277.00
 TOTAL STREAM AREA(ACRES) = 1539.41
 PEAK FLOW RATE(CFS) AT CONFLUENCE =   2278.78


****************************************************************************
 FLOW PROCESS FROM NODE   456.10 TO NODE   456.10 IS CODE =   7
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  27.34   RAIN INTENSITY(INCH/HOUR) =  2.36
 EFFECTIVE AREA(ACRES) =   481.31
 TOTAL AREA(ACRES) =   515.00   PEAK FLOW RATE(CFS) =   768.43
 AVERAGED LOSS RATE, Fm(IN/HR) =   .582
```

DATA FROM WFONCHLS.DES "T-5"

```
****************************************************************************
 FLOW PROCESS FROM NODE   456.10 TO NODE   456.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MINUTES) =  27.34
 RAINFALL INTENSITY (INCH./HOUR) =   2.36
 EFFECTIVE STREAM AREA(ACRES) =  481.31
 TOTAL STREAM AREA(ACRES) =  515.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    768.43

 CONFLUENCE INFORMATION:
 STREAM    PEAK FLOW    TIME    INTENSITY     FM     EFFECTIVE
 NUMBER    RATE(CFS)   (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
----------------------------------------------------------------------
   1      2278.78      26.99       2.374      .58      1277.00
   2       768.43      27.34       2.356      .58       481.31

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.
 SUMMARY RESULTS:
 STREAM    CONFLUENCE    EFFECTIVE
 NUMBER      Q(CFS)     AREA(ACRES)
-----------------------------------------
   1      3045.16       1752.07
   2      3023.66       1758.31
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =   3045.16   TIME(MINUTES) =   26.985
 EFFECTIVE AREA(ACRES) =   1752.07
 TOTAL AREA(ACRES) =   2054.41


****************************************************************************
 FLOW PROCESS FROM NODE   456.10 TO NODE   458.10 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1223.30
 DOWNSTREAM NODE ELEVATION =   1207.30
 CHANNEL LENGTH THRU SUBAREA(FEET) =  2640.00
 CHANNEL BASE(FEET) =   35.00   "Z" FACTOR =    .000
 MANNINGS FACTOR =  .014   MAXIMUM DEPTH(FEET) =   5.50
 CHANNEL FLOW THRU SUBAREA(CFS) =   3045.16
 FLOW VELOCITY(FEET/SEC) =  19.33   FLOW DEPTH(FEET) =   4.50
 TRAVEL TIME(MIN.) =   2.28   TC(MIN.) =  29.26


****************************************************************************
 FLOW PROCESS FROM NODE   458.10 TO NODE   458.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
==========================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MINUTES) =  29.26
  RAINFALL INTENSITY (INCH./HOUR) =   2.26
  EFFECTIVE STREAM AREA(ACRES) = 1752.07
  TOTAL STREAM AREA(ACRES) = 2054.41
  PEAK FLOW RATE(CFS) AT CONFLUENCE =   3045.16


**************************************************************************
  FLOW PROCESS FROM NODE   458.10 TO NODE   458.10 IS CODE =   7
--------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
==========================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:                          DATA
  TC(MIN) =  22.84   RAIN INTENSITY(INCH/HOUR) =  2.62          FROM
  EFFECTIVE AREA(ACRES) =   186.00
  TOTAL AREA(ACRES) =   186.00   PEAK FLOW RATE(CFS) =   341.85
  AVERAGED LOSS RATE, Fm(IN/HR) =   .582
  ***ERROR; SPECIFIED LOSS RATE, FM IS LESS THAN MINIMUM  WFONTGR.100
            POSSIBLE VALUE OF   .58(INCHES/HOUR)
                                                          "T-6"

**************************************************************************
  FLOW PROCESS FROM NODE   458.10 TO NODE   458.10 IS CODE =   1
--------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==========================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MINUTES) =  22.84
  RAINFALL INTENSITY (INCH./HOUR) =   2.62
  EFFECTIVE STREAM AREA(ACRES) =  186.00
  TOTAL STREAM AREA(ACRES) =  186.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =   341.85

  CONFLUENCE INFORMATION:
  STREAM    PEAK FLOW    TIME    INTENSITY     FM     EFFECTIVE
  NUMBER    RATE(CFS)   (MIN.)  (INCH/HOUR)  (IN/HR) AREA(ACRES)
--------------------------------------------------------------------------
    1      3045.16      29.26       2.262       .58     1752.07
    2       341.85      22.84       2.624       .58      186.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.
  SUMMARY RESULTS:
  STREAM    CONFLUENCE    EFFECTIVE
  NUMBER      Q(CFS)     AREA(ACRES)
-------------------------------------------
    1      3326.33       1938.07
    2      3231.62       1553.57
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =   3326.33   TIME(MINUTES) =   29.262
  EFFECTIVE AREA(ACRES) =   1938.07
  TOTAL AREA(ACRES) =   2240.41
```

```
****************************************************************************
 FLOW PROCESS FROM NODE   458.10 TO NODE   140.30 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1207.30
 DOWNSTREAM NODE ELEVATION =   1199.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1955.00
 CHANNEL BASE(FEET) =   40.00   "Z" FACTOR =    .000
 MANNINGS FACTOR =  .014   MAXIMUM DEPTH(FEET) =   6.00
 CHANNEL FLOW THRU SUBAREA(CFS) =   3326.33
 FLOW VELOCITY(FEET/SEC) =  17.18   FLOW DEPTH(FEET) =   4.84
 TRAVEL TIME(MIN.) =   1.90   TC(MIN.) =  31.16


****************************************************************************
 FLOW PROCESS FROM NODE   140.30 TO NODE   140.30 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  31.16
 RAINFALL INTENSITY (INCH./HOUR) =   2.18
 EFFECTIVE STREAM AREA(ACRES) = 1938.07
 TOTAL STREAM AREA(ACRES) = 2240.41
 PEAK FLOW RATE(CFS) AT CONFLUENCE =   3326.33


****************************************************************************
 FLOW PROCESS FROM NODE   140.30 TO NODE   140.30 IS CODE =   7
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:                    DATA
 TC(MIN) =  23.81   RAIN INTENSITY(INCH/HOUR) =  2.56     FROM
 EFFECTIVE AREA(ACRES) =   473.37
 TOTAL AREA(ACRES) =   546.70   PEAK FLOW RATE(CFS) =   842.70
 AVERAGED LOSS RATE, Fm(IN/HR) =   .582
                                          WFCNTRA.100 &
                                          WFCNTRB.100  T-7
****************************************************************************
 FLOW PROCESS FROM NODE   140.30 TO NODE   140.30 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MINUTES) =  23.81
 RAINFALL INTENSITY (INCH./HOUR) =   2.56
 EFFECTIVE STREAM AREA(ACRES) =  473.37
 TOTAL STREAM AREA(ACRES) =  546.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =   842.70
```

```
 CONFLUENCE INFORMATION:
 STREAM    PEAK FLOW    TIME    INTENSITY     FM     EFFECTIVE
 NUMBER    RATE(CFS)   (MIN.)  (INCH/HOUR)  (IN/HR) AREA(ACRES)
-------------------------------------------------------------------
   1      3326.33      31.16       2.178       .58      1938.07
   2       842.70      23.81       2.559       .58       473.37

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.
 SUMMARY RESULTS:
 STREAM    CONFLUENCE    EFFECTIVE
 NUMBER      Q(CFS)     AREA(ACRES)
-----------------------------------------
   1      4006.48       2411.44
   2      3991.99       1954.39
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =   4006.48   TIME(MINUTES) =   31.158
 EFFECTIVE AREA(ACRES) =   2411.44
 TOTAL AREA(ACRES) =   2787.11


****************************************************************************
 FLOW PROCESS FROM NODE   140.30 TO NODE   600.04 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1200.00
 DOWNSTREAM NODE ELEVATION =   1190.90
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1300.00
 CHANNEL BASE(FEET) =   40.00   "Z" FACTOR =    .000
 MANNINGS FACTOR =  .014   MAXIMUM DEPTH(FEET) =   6.00
 CHANNEL FLOW THRU SUBAREA(CFS) =   4006.48
 FLOW VELOCITY(FEET/SEC) =  21.53   FLOW DEPTH(FEET) =   4.65
 TRAVEL TIME(MIN.) =   1.01   TC(MIN.) =  32.16


****************************************************************************
 FLOW PROCESS FROM NODE   140.30 TO NODE   140.30 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  32.16
 RAINFALL INTENSITY (INCH./HOUR) =   2.14
 EFFECTIVE STREAM AREA(ACRES) = 2411.44
 TOTAL STREAM AREA(ACRES) = 2787.11
 PEAK FLOW RATE(CFS) AT CONFLUENCE =   4006.48


****************************************************************************
 FLOW PROCESS FROM NODE   600.04 TO NODE   600.04 IS CODE =   7
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
```

```
==========================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:                    DATA
  TC(MIN) =  30.06   RAIN INTENSITY(INCH/HOUR) =  2.23     FROM
  EFFECTIVE AREA(ACRES) =   392.83
  TOTAL AREA(ACRES) =   403.30   PEAK FLOW RATE(CFS) =    584.63
  AVERAGED LOSS RATE, Fm(IN/HR) =   .582          WFONTERA.100 &
                                                  WFONTERB.100 "T-B"
**************************************************************************
  FLOW PROCESS FROM NODE   140.30 TO NODE   140.30 IS CODE =   1
--------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==========================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MINUTES) =  30.06
  RAINFALL INTENSITY (INCH./HOUR) =   2.23
  EFFECTIVE STREAM AREA(ACRES) =  392.83
  TOTAL STREAM AREA(ACRES) =  403.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    584.63

  CONFLUENCE INFORMATION:
  STREAM    PEAK FLOW    TIME    INTENSITY     FM     EFFECTIVE
  NUMBER    RATE(CFS)   (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
--------------------------------------------------------------------
    1      4006.48      32.16        2.137      .58      2411.44
    2       584.63      30.06        2.225      .58       392.83

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.
  SUMMARY RESULTS:
  STREAM    CONFLUENCE    EFFECTIVE
  NUMBER      Q(CFS)     AREA(ACRES)
-----------------------------------------
    1      4559.62       2804.27
    2      4542.18       2646.50
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =   4559.62   TIME(MINUTES) =   32.164
  EFFECTIVE AREA(ACRES) =   2804.27
  TOTAL AREA(ACRES) =   3190.41
==========================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =   3190.41
  EFFECTIVE AREA(ACRES) =   2804.27
  PEAK FLOW RATE(CFS)    =   4559.62
==========================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        Copyright 1983,86,87 Advanced Engineering Software (aes)
          Ver. 4.1C  Release Date: 5/11/87  Serial # I00908

                        Especially prepared for:

                            HALL & FOREMAN
 *************************** DESCRIPTION OF STUDY ***********************
* N. FONTANA MASTER S.D. PLAN, W. FONTANA LAT. 1, ALONG JUNIPER
* Q 100 YEAR, NOT DESIGN Q
* JN 3547
 **************************************************************************

  FILE NAME: WFONT1R.100
  TIME/DATE OF STUDY:  0:31   1/ 1/1980
==========================================================================
  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 =
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =   .970
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) = 1.4700
  SLOPE OF INTENSITY DURATION CURVE =  .6000



**************************************************************************
  FLOW PROCESS FROM NODE   105.00 TO NODE  105.01 IS CODE =   2
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

  TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
  INITIAL SUBAREA FLOW-LENGTH =   800.00
  UPSTREAM ELEVATION =   1365.00
  DOWNSTREAM ELEVATION =   1355.00
  ELEVATION DIFFERENCE =     10.00
  TC =  .412*[(  800.00** 3.00)/(    10.00)]** .20 =   14.347
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.469
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA RUNOFF(CFS) =     20.78
  TOTAL AREA(ACRES) =      8.00   PEAK FLOW RATE(CFS) =     20.78
```

```
****************************************************************************
 FLOW PROCESS FROM NODE   105.01 TO NODE   105.02 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1355.00   DOWNSTREAM ELEVATION =   1340.00
 STREET LENGTH(FEET) =   900.00   CURB HEIGTH(INCHES) = 6.
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  18.50
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   20.78
   STREETFLOW MODEL RESULTS:
      STREET FLOWDEPTH(FEET) =   .45
      HALFSTREET FLOODWIDTH(FEET) =   16.24
      AVERAGE FLOW VELOCITY(FEET/SEC.) =   3.77
      PRODUCT OF DEPTH&VELOCITY =   1.70
 STREETFLOW TRAVELTIME(MIN) =   3.98   TC(MIN) =  18.33

  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.995
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =    8.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =    8.00   PEAK FLOW RATE(CFS) =     20.78
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .45   HALFSTREET FLOODWIDTH(FEET) = 16.24
 FLOW VELOCITY(FEET/SEC.) =  3.77   DEPTH*VELOCITY =   1.70


****************************************************************************
 FLOW PROCESS FROM NODE   105.10 TO NODE   105.02 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.995
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   19.00   SUBAREA RUNOFF(CFS) =   41.26
 EFFECTIVE AREA(ACRES) =   27.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   27.00
 PEAK FLOW RATE(CFS) =   58.63
 TC(MIN) =  18.33


****************************************************************************
 FLOW PROCESS FROM NODE   105.02 TO NODE   105.03 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
```

```
==========================================================================
 UPSTREAM ELEVATION =   1340.00   DOWNSTREAM ELEVATION =   1318.50
 STREET LENGTH(FEET) =  1300.00   CURB HEIGTH(INCHES) = 6.
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  18.50
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   58.63
 ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS:
      NOTE: STREETFLOW EXCEEDS TOP OF CURB.
      THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .59
      HALFSTREET FLOODWIDTH(FEET) =   20.00
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.34
      PRODUCT OF DEPTH&VELOCITY =    3.18
 STREETFLOW TRAVELTIME(MIN) =   4.05   TC(MIN) =  22.38

  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.656
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   27.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =   27.00   PEAK FLOW RATE(CFS) =     58.63
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) = .59   HALFSTREET FLOODWIDTH(FEET) = 20.00
 FLOW VELOCITY(FEET/SEC.) =  5.34   DEPTH*VELOCITY =   3.18


**************************************************************************
 FLOW PROCESS FROM NODE   105.20 TO NODE   105.03 IS CODE =   8
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.656
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   26.00   SUBAREA RUNOFF(CFS) =   48.54
 EFFECTIVE AREA(ACRES) =   53.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   53.00
 PEAK FLOW RATE(CFS) =   98.95
 TC(MIN) =  22.38


**************************************************************************
 FLOW PROCESS FROM NODE   105.03 TO NODE   106.10 IS CODE =   4
--------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
  PIPEFLOW VELOCITY(FEET/SEC.) =  10.3
  UPSTREAM NODE ELEVATION =  1318.50
  DOWNSTREAM NODE ELEVATION =  1318.00
  FLOWLENGTH(FEET) =   320.00   MANNINGS N =  .013
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =     98.95
  TRAVEL TIME(MIN.) =    .52    TC(MIN.) =  22.90


****************************************************************************
  FLOW PROCESS FROM NODE   106.00 TO NODE   106.10 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.620
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   36.69
  EFFECTIVE AREA(ACRES) =   73.00
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =   73.00
  PEAK FLOW RATE(CFS) =  133.91
  TC(MIN) =  22.90


****************************************************************************
  FLOW PROCESS FROM NODE   106.10 TO NODE   107.10 IS CODE =   4
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
  PIPEFLOW VELOCITY(FEET/SEC.) =  13.9
  UPSTREAM NODE ELEVATION =  1318.00
  DOWNSTREAM NODE ELEVATION =  1317.00
  FLOWLENGTH(FEET) =   320.00   MANNINGS N =  .013
  GIVEN PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    133.91
  TRAVEL TIME(MIN.) =    .38    TC(MIN.) =  23.28


****************************************************************************
  FLOW PROCESS FROM NODE   107.00 TO NODE   107.10 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.594
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   36.22
  EFFECTIVE AREA(ACRES) =   93.00
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =   93.00
```

```
 PEAK FLOW RATE(CFS) =  168.42
 TC(MIN) =  23.28

****************************************************************************
 FLOW PROCESS FROM NODE   107.10 TO NODE   108.10 IS CODE =   4
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
 PIPEFLOW VELOCITY(FEET/SEC.) =  13.4
 UPSTREAM NODE ELEVATION =  1317.00
 DOWNSTREAM NODE ELEVATION =  1315.00
 FLOWLENGTH(FEET) =   640.00   MANNINGS N =  .013
 GIVEN PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    168.42
 TRAVEL TIME(MIN.) =    .80    TC(MIN.) =  24.08

****************************************************************************
 FLOW PROCESS FROM NODE   108.00 TO NODE   108.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.542
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   70.58
 EFFECTIVE AREA(ACRES) =  133.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  133.00
 PEAK FLOW RATE(CFS) =  234.66
 TC(MIN) =  24.08

****************************************************************************
 FLOW PROCESS FROM NODE   108.10 TO NODE   108.12 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  54.0 INCH PIPE IS  43.4 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  17.1
 UPSTREAM NODE ELEVATION =  1315.00
 DOWNSTREAM NODE ELEVATION =  1294.00
 FLOWLENGTH(FEET) =  1350.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    234.66
 TRAVEL TIME(MIN.) =   1.31    TC(MIN.) =  25.39

****************************************************************************
 FLOW PROCESS FROM NODE   108.11 TO NODE   108.12 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
================================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.463
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   67.71
EFFECTIVE AREA(ACRES) =  173.00
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =  173.00
PEAK FLOW RATE(CFS) =  292.83
TC(MIN) =  25.39


****************************************************************************
FLOW PROCESS FROM NODE   108.12 TO NODE   108.22 IS CODE =   3
----------------------------------------------------------------------------
>>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
DEPTH OF FLOW IN  60.0 INCH PIPE IS  44.7 INCHES
PIPEFLOW VELOCITY(FEET/SEC.) =  18.7
UPSTREAM NODE ELEVATION =  1294.00
DOWNSTREAM NODE ELEVATION =  1272.00
FLOWLENGTH(FEET) =  1350.00   MANNINGS N =  .013
ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
PIPEFLOW THRU SUBAREA(CFS) =   292.83
TRAVEL TIME(MIN.) =   1.20    TC(MIN.) =  26.59


****************************************************************************
FLOW PROCESS FROM NODE   108.20 TO NODE   108.22 IS CODE =   8
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.395
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   65.27
EFFECTIVE AREA(ACRES) =  213.00
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =  213.00
PEAK FLOW RATE(CFS) =  347.59
TC(MIN) =  26.59


****************************************************************************
FLOW PROCESS FROM NODE   108.22 TO NODE   108.31 IS CODE =   4
----------------------------------------------------------------------------
>>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
>>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
PIPEFLOW VELOCITY(FEET/SEC.) =  24.5
UPSTREAM NODE ELEVATION =  1272.00
DOWNSTREAM NODE ELEVATION =  1261.00
FLOWLENGTH(FEET) =   650.00   MANNINGS N =  .013
GIVEN PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
```

```
 PIPEFLOW THRU SUBAREA(CFS) =    347.59
 TRAVEL TIME(MIN.) =    .44    TC(MIN.) =  27.04

****************************************************************************
 FLOW PROCESS FROM NODE   108.31 TO NODE   108.31 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  27.04
 RAINFALL INTENSITY (INCH./HOUR) =   2.37
 EFFECTIVE STREAM AREA(ACRES) =  213.00
 TOTAL STREAM AREA(ACRES) =  213.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    347.59

****************************************************************************
 FLOW PROCESS FROM NODE   108.52 TO NODE   108.51 IS CODE =   2
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH =   800.00
 UPSTREAM ELEVATION =   1276.00
 DOWNSTREAM ELEVATION =   1268.00
 ELEVATION DIFFERENCE =      8.00
 TC =  .412*[(  800.00** 3.00)/(     8.00)]** .20 =   15.001
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.377
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA RUNOFF(CFS) =     25.15
 TOTAL AREA(ACRES) =     10.00   PEAK FLOW RATE(CFS) =     25.15

****************************************************************************
 FLOW PROCESS FROM NODE   108.51 TO NODE   108.41 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1268.00   DOWNSTREAM ELEVATION =   1263.00
 STREET LENGTH(FEET) =   600.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   25.15
   STREETFLOW MODEL RESULTS:
      STREET FLOWDEPTH(FEET) =   .63
```

```
        HALFSTREET FLOODWIDTH(FEET) =   17.38
        AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.30
        PRODUCT OF DEPTH&VELOCITY =    2.07
 STREETFLOW TRAVELTIME(MIN) =   3.03   TC(MIN) =  18.03

  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.024
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   10.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   10.00   PEAK FLOW RATE(CFS) =     25.15
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .63   HALFSTREET FLOODWIDTH(FEET) = 17.38
 FLOW VELOCITY(FEET/SEC.) =  3.30   DEPTH*VELOCITY =   2.07


****************************************************************************
 FLOW PROCESS FROM NODE   108.42 TO NODE   108.41 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.024
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   10.00   SUBAREA RUNOFF(CFS) =   21.98
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   20.00
 PEAK FLOW RATE(CFS) =   43.96
 TC(MIN) =  18.03


****************************************************************************
 FLOW PROCESS FROM NODE   108.43 TO NODE   108.41 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.024
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   15.00   SUBAREA RUNOFF(CFS) =   32.97
 EFFECTIVE AREA(ACRES) =   35.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   35.00
 PEAK FLOW RATE(CFS) =   76.93
 TC(MIN) =  18.03


****************************************************************************
 FLOW PROCESS FROM NODE   108.41 TO NODE   108.31 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  41.7 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   5.5
 UPSTREAM NODE ELEVATION =  1263.00
 DOWNSTREAM NODE ELEVATION =  1261.00
 FLOWLENGTH(FEET) =  1300.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =     76.93
 TRAVEL TIME(MIN.) =   3.91    TC(MIN.) =  21.94


****************************************************************************
 FLOW PROCESS FROM NODE   108.30 TO NODE   108.31 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.688
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   37.91
 EFFECTIVE AREA(ACRES) =   55.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   55.00
 PEAK FLOW RATE(CFS) =  104.24
 TC(MIN) =  21.94


****************************************************************************
 FLOW PROCESS FROM NODE   108.35 TO NODE   108.31 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.688
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   37.91
 EFFECTIVE AREA(ACRES) =   75.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   75.00
 PEAK FLOW RATE(CFS) =  142.15
 TC(MIN) =  21.94


****************************************************************************
 FLOW PROCESS FROM NODE   108.31 TO NODE   108.31 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MINUTES) =  21.94
 RAINFALL INTENSITY (INCH./HOUR) =   2.69
 EFFECTIVE STREAM AREA(ACRES) =   75.00
 TOTAL STREAM AREA(ACRES) =   75.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    142.15
```

```
  CONFLUENCE INFORMATION:
  STREAM    PEAK FLOW    TIME    INTENSITY     FM     EFFECTIVE
  NUMBER    RATE(CFS)   (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
-------------------------------------------------------------------
    1       347.59      27.04       2.372      .58       213.00
    2       142.15      21.94       2.688      .58        75.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.
  SUMMARY RESULTS:
  STREAM    CONFLUENCE    EFFECTIVE
  NUMBER      Q(CFS)     AREA(ACRES)
-----------------------------------------
    1       468.39        288.00
    2       474.14        247.89
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    474.14   TIME(MINUTES) =   21.944
  EFFECTIVE AREA(ACRES) =    247.89
  TOTAL AREA(ACRES) =    288.00


****************************************************************************
  FLOW PROCESS FROM NODE   108.31 TO NODE   108.32 IS CODE =   4
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
  PIPEFLOW VELOCITY(FEET/SEC.) =  33.4
  UPSTREAM NODE ELEVATION =  1261.00
  DOWNSTREAM NODE ELEVATION =  1249.00
  FLOWLENGTH(FEET) =   650.00   MANNINGS N =  .013
  GIVEN PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    474.14
  TRAVEL TIME(MIN.) =    .32    TC(MIN.) =  22.27


****************************************************************************
  FLOW PROCESS FROM NODE   108.32 TO NODE   108.33 IS CODE =   4
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
  PIPEFLOW VELOCITY(FEET/SEC.) =  29.8
  UPSTREAM NODE ELEVATION =  1249.00
  DOWNSTREAM NODE ELEVATION =  1243.00
  FLOWLENGTH(FEET) =   300.00   MANNINGS N =  .013
  GIVEN PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    474.14
  TRAVEL TIME(MIN.) =    .17    TC(MIN.) =  22.44
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =    288.00
  EFFECTIVE AREA(ACRES) =    247.89
  PEAK FLOW RATE(CFS)    =    474.14
============================================================================
```

END OF RATIONAL METHOD ANALYSIS

```
**********************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        Copyright 1983,86,87 Advanced Engineering Software (aes)
          Ver. 4.1C  Release Date: 5/11/87  Serial # I00908

                        Especially prepared for:

                           HALL & FOREMAN
 ************************* DESCRIPTION OF STUDY ***********************
* N. FONTANA MASTER S.D. PLAN, W. FONTANA CHANNEL DESIGN, LATERAL 2 ALO
* CYPRESS, CHANNEL DESIGN-Q 100 YEAR + OVERFLOW FROM JUNIPER & BASELINE
* + OVERFLOW FROM CYPRESS + BASELINE. JN 3547
 **********************************************************************

  FILE NAME: WFONCHL2.DES
  TIME/DATE OF STUDY:  4:13   1/ 1/1980
======================================================================
  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 =
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =   .970
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) = 1.4700
  SLOPE OF INTENSITY DURATION CURVE =  .6000



**********************************************************************
  FLOW PROCESS FROM NODE   100.00 TO NODE  100.01 IS CODE =   2
----------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
======================================================================
  DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

  TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
  INITIAL SUBAREA FLOW-LENGTH =   900.00
  UPSTREAM ELEVATION =   1417.00
  DOWNSTREAM ELEVATION =   1408.00
  ELEVATION DIFFERENCE =      9.00
  TC =  .412*[(  900.00** 3.00)/(     9.00)]** .20 =   15.725
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.283
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA RUNOFF(CFS) =     24.31
  TOTAL AREA(ACRES) =     10.00   PEAK FLOW RATE(CFS) =     24.31
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    100.01 TO NODE    100.02 IS CODE =    6
----------------------------------------------------------------------------
  >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM ELEVATION =    1408.00    DOWNSTREAM ELEVATION =    1364.00
  STREET LENGTH(FEET) =   2200.00    CURB HEIGTH(INCHES) = 6.
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  18.50
  INTERIOR STREET CROSSFALL(DECIMAL) =    .020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =    .020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

        **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =    24.31
    STREETFLOW MODEL RESULTS:
        STREET FLOWDEPTH(FEET) =    .46
        HALFSTREET FLOODWIDTH(FEET) =   16.82
        AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.12
        PRODUCT OF DEPTH&VELOCITY =    1.91
  STREETFLOW TRAVELTIME(MIN) =    8.89   TC(MIN) =  24.62

   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.509
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =   .5
  SUBAREA AREA(ACRES) =      .00   SUBAREA RUNOFF(CFS) =      .00
  EFFECTIVE AREA(ACRES) =   10.00
  AVERAGED Fm(INCH/HR) =    .582
  TOTAL AREA(ACRES) =    10.00   PEAK FLOW RATE(CFS) =     24.31
  END OF SUBAREA STREETFLOW HYDRAULICS:
  DEPTH(FEET) =  .46   HALFSTREET FLOODWIDTH(FEET) = 16.82
  FLOW VELOCITY(FEET/SEC.) =  4.12   DEPTH*VELOCITY =   1.91


****************************************************************************
  FLOW PROCESS FROM NODE    100.10 TO NODE    100.02 IS CODE =    8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.509
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =   .5
  SUBAREA AREA(ACRES) =    41.00   SUBAREA RUNOFF(CFS) =    71.10
  EFFECTIVE AREA(ACRES) =   51.00
  AVERAGED Fm(INCH/HR) =    .582
  TOTAL AREA(ACRES) =    51.00
  PEAK FLOW RATE(CFS) =    88.44
  TC(MIN) =  24.62


****************************************************************************
  FLOW PROCESS FROM NODE    100.02 TO NODE    101.10 IS CODE =    3
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
```

```
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  46.9 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   5.4
 UPSTREAM NODE ELEVATION =  1364.00
 DOWNSTREAM NODE ELEVATION =  1363.60
 FLOWLENGTH(FEET) =   300.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =     88.44
 TRAVEL TIME(MIN.) =    .93    TC(MIN.) =  25.55


****************************************************************************
 FLOW PROCESS FROM NODE   101.00 TO NODE   101.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.454
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   33.69
 EFFECTIVE AREA(ACRES) =   71.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   71.00
 PEAK FLOW RATE(CFS) =  119.59
 TC(MIN) =  25.55


****************************************************************************
 FLOW PROCESS FROM NODE   101.10 TO NODE   102.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
 DEPTH OF FLOW IN  69.0 INCH PIPE IS  50.6 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   5.9
 UPSTREAM NODE ELEVATION =  1363.60
 DOWNSTREAM NODE ELEVATION =  1363.20
 FLOWLENGTH(FEET) =   300.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    119.59
 TRAVEL TIME(MIN.) =    .85    TC(MIN.) =  26.40


****************************************************************************
 FLOW PROCESS FROM NODE   102.00 TO NODE   102.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.406
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   32.83
 EFFECTIVE AREA(ACRES) =   91.00
 AVERAGED Fm(INCH/HR) =   .582
```

```
 TOTAL AREA(ACRES) =   91.00
 PEAK FLOW RATE(CFS) =  149.36
 TC(MIN) =  26.40

****************************************************************************
 FLOW PROCESS FROM NODE   102.10 TO NODE   103.10 IS CODE =   4
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
 PIPEFLOW VELOCITY(FEET/SEC.) =   6.9
 UPSTREAM NODE ELEVATION =  1363.20
 DOWNSTREAM NODE ELEVATION =  1362.00
 FLOWLENGTH(FEET) =   600.00   MANNINGS N =  .013
 GIVEN PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    149.36
 TRAVEL TIME(MIN.) =   1.45    TC(MIN.) =  27.85

****************************************************************************
 FLOW PROCESS FROM NODE   103.00 TO NODE   103.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.330
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   62.92
 EFFECTIVE AREA(ACRES) =  131.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  131.00
 PEAK FLOW RATE(CFS) =  206.06
 TC(MIN) =  27.85

****************************************************************************
 FLOW PROCESS FROM NODE   103.10 TO NODE   103.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  27.85
 RAINFALL INTENSITY (INCH./HOUR) =   2.33
 EFFECTIVE STREAM AREA(ACRES) =  131.00
 TOTAL STREAM AREA(ACRES) =  131.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    206.06

****************************************************************************
 FLOW PROCESS FROM NODE   211.10 TO NODE   211.10 IS CODE =   7
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
```

```
 TC(MIN) =  19.10   RAIN INTENSITY(INCH/HOUR) =  2.92
 EFFECTIVE AREA(ACRES) =    41.00
 TOTAL AREA(ACRES) =    41.00   PEAK FLOW RATE(CFS) =     92.00
 AVERAGED LOSS RATE, Fm(IN/HR) =   .582


****************************************************************************
 FLOW PROCESS FROM NODE   211.10 TO NODE   103.10 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1412.00   DOWNSTREAM ELEVATION =   1362.00
 STREET LENGTH(FEET) =  2750.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

       **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   92.00
 ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS:
       NOTE: STREETFLOW EXCEEDS TOP OF CURB.
       THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .79
       HALFSTREET FLOODWIDTH(FEET) =   20.00
       AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.63
       PRODUCT OF DEPTH&VELOCITY =    5.21
 STREETFLOW TRAVELTIME(MIN) =   6.91   TC(MIN) =  26.01

  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.427
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   41.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   41.00   PEAK FLOW RATE(CFS) =     92.00
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .79   HALFSTREET FLOODWIDTH(FEET) = 20.00
 FLOW VELOCITY(FEET/SEC.) =  6.63   DEPTH*VELOCITY =   5.21


****************************************************************************
 FLOW PROCESS FROM NODE   103.10 TO NODE   103.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MINUTES) =  26.01
 RAINFALL INTENSITY (INCH./HOUR) =   2.43
```

```
 EFFECTIVE STREAM AREA(ACRES) =   41.00
 TOTAL STREAM AREA(ACRES) =   41.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     92.00

 CONFLUENCE INFORMATION:
 STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
 NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
-------------------------------------------------------------
   1      206.06     27.85       2.330     .58      131.00
   2       92.00     26.01       2.427     .58       41.00

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.
 SUMMARY RESULTS:
 STREAM   CONFLUENCE   EFFECTIVE
 NUMBER     Q(CFS)    AREA(ACRES)
---------------------------------------------
   1      293.20       172.00
   2      295.19       163.35
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    295.19   TIME(MINUTES) =   26.013
 EFFECTIVE AREA(ACRES) =    163.35
 TOTAL AREA(ACRES) =    172.00


****************************************************************************
 FLOW PROCESS FROM NODE   103.10 TO NODE   104.22 IS CODE =   4
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
 PIPEFLOW VELOCITY(FEET/SEC.) =  13.6
 UPSTREAM NODE ELEVATION =  1362.00
 DOWNSTREAM NODE ELEVATION =  1359.00
 FLOWLENGTH(FEET) =   600.00   MANNINGS N =   .013
 GIVEN PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    295.19
 TRAVEL TIME(MIN.) =    .73    TC(MIN.) =  26.75


****************************************************************************
 FLOW PROCESS FROM NODE   104.21 TO NODE   104.22 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.387
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   64.98
 EFFECTIVE AREA(ACRES) =  203.35
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  212.00
 PEAK FLOW RATE(CFS) =  330.35
 TC(MIN) =  26.75
```

```
**********************************************************************
 FLOW PROCESS FROM NODE   104.22 TO NODE   104.10 IS CODE =   4
----------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
======================================================================
 PIPEFLOW VELOCITY(FEET/SEC.) =  15.3
 UPSTREAM NODE ELEVATION =  1359.00
 DOWNSTREAM NODE ELEVATION =  1356.00
 FLOWLENGTH(FEET) =   600.00   MANNINGS N =  .013
 GIVEN PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    330.35
 TRAVEL TIME(MIN.) =    .66    TC(MIN.) =  27.40


**********************************************************************
 FLOW PROCESS FROM NODE   104.31 TO NODE   104.10 IS CODE =   8
----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.353
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   63.74
 EFFECTIVE AREA(ACRES) =  243.35
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  252.00
 PEAK FLOW RATE(CFS) =  387.79
 TC(MIN) =  27.40


**********************************************************************
 FLOW PROCESS FROM NODE   104.10 TO NODE   104.10 IS CODE =   1
----------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
======================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  27.40
 RAINFALL INTENSITY (INCH./HOUR) =   2.35
 EFFECTIVE STREAM AREA(ACRES) =  243.35
 TOTAL STREAM AREA(ACRES) =  252.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    387.79


**********************************************************************
 FLOW PROCESS FROM NODE   212.10 TO NODE   212.10 IS CODE =   7
----------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
======================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  18.60   RAIN INTENSITY(INCH/HOUR) =  2.97
 EFFECTIVE AREA(ACRES) =    45.10
 TOTAL AREA(ACRES) =    45.10   PEAK FLOW RATE(CFS) =     96.40
 AVERAGED LOSS RATE, Fm(IN/HR) =   .582
```

```
 ***ERROR; SPECIFIED LOSS RATE, FM IS LESS THAN MINIMUM
           POSSIBLE VALUE OF   .59(INCHES/HOUR)


****************************************************************************
 FLOW PROCESS FROM NODE   212.10 TO NODE   104.10 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1408.00   DOWNSTREAM ELEVATION =   1356.00
 STREET LENGTH(FEET) =  2750.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

       **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   96.40
 ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS:
       NOTE: STREETFLOW EXCEEDS TOP OF CURB.
       THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .81
       HALFSTREET FLOODWIDTH(FEET) =   20.00
       AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.58
       PRODUCT OF DEPTH&VELOCITY =    5.30
 STREETFLOW TRAVELTIME(MIN) =   6.97   TC(MIN) =  25.57

  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.452
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   45.10
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   45.10   PEAK FLOW RATE(CFS) =    96.40
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .81   HALFSTREET FLOODWIDTH(FEET) = 20.00
 FLOW VELOCITY(FEET/SEC.) =  6.58   DEPTH*VELOCITY =   5.30


****************************************************************************
 FLOW PROCESS FROM NODE   104.10 TO NODE   104.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MINUTES) =  25.57
 RAINFALL INTENSITY (INCH./HOUR) =   2.45
 EFFECTIVE STREAM AREA(ACRES) =   45.10
 TOTAL STREAM AREA(ACRES) =   45.10
```

```
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     96.40

 CONFLUENCE INFORMATION:
 STREAM    PEAK FLOW    TIME    INTENSITY     FM     EFFECTIVE
 NUMBER    RATE(CFS)   (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
------------------------------------------------------------
   1       387.79      27.40       2.353     .58       243.35
   2        96.40      25.57       2.452     .58        45.10

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.
 SUMMARY RESULTS:
 STREAM    CONFLUENCE    EFFECTIVE
 NUMBER      Q(CFS)     AREA(ACRES)
-------------------------------------------
   1       479.05        288.45
   2       478.64        272.18
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    479.05   TIME(MINUTES) =   27.401
 EFFECTIVE AREA(ACRES) =    288.45
 TOTAL AREA(ACRES) =    297.10


****************************************************************************
 FLOW PROCESS FROM NODE   104.10 TO NODE   109.23 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  72.0 INCH PIPE IS  53.3 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  21.3
 UPSTREAM NODE ELEVATION =  1356.00
 DOWNSTREAM NODE ELEVATION =  1311.00
 FLOWLENGTH(FEET) =  2700.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    479.05
 TRAVEL TIME(MIN.) =   2.11    TC(MIN.) =  29.51


****************************************************************************
 FLOW PROCESS FROM NODE   109.23 TO NODE   109.23 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  29.51
 RAINFALL INTENSITY (INCH./HOUR) =   2.25
 EFFECTIVE STREAM AREA(ACRES) =  288.45
 TOTAL STREAM AREA(ACRES) =  297.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    479.05


****************************************************************************
 FLOW PROCESS FROM NODE   109.00 TO NODE   109.01 IS CODE =   2
----------------------------------------------------------------------------
```

```
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==============================================================================
  DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

  TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
  INITIAL SUBAREA FLOW-LENGTH =  1000.00
  UPSTREAM ELEVATION =   1362.00
  DOWNSTREAM ELEVATION =   1345.00
  ELEVATION DIFFERENCE =     17.00
  TC =  .412*[( 1000.00** 3.00)/(    17.00)]** .20 =   14.751
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.411
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA RUNOFF(CFS) =     11.71
  TOTAL AREA(ACRES) =      4.60   PEAK FLOW RATE(CFS) =     11.71


****************************************************************************
  FLOW PROCESS FROM NODE   109.01 TO NODE   109.11 IS CODE =   5
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  UPSTREAM NODE ELEVATION =   1345.00
  DOWNSTREAM NODE ELEVATION =   1326.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
  MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     11.71
  FLOW VELOCITY(FEET/SEC) =   4.27   FLOW DEPTH(FEET) =    .64
  TRAVEL TIME(MIN.) =   3.90   TC(MIN.) =  18.65


****************************************************************************
  FLOW PROCESS FROM NODE   109.10 TO NODE   109.11 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.963
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =    4.60   SUBAREA RUNOFF(CFS) =    9.86
  EFFECTIVE AREA(ACRES) =    9.20
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =    9.20
  PEAK FLOW RATE(CFS) =   19.72
  TC(MIN) =  18.65


****************************************************************************
  FLOW PROCESS FROM NODE   109.11 TO NODE   109.02 IS CODE =   5
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
```

```
 UPSTREAM NODE ELEVATION =   1326.00
 DOWNSTREAM NODE ELEVATION =   1314.30
 CHANNEL LENGTH THRU SUBAREA(FEET) =   650.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     19.72
 FLOW VELOCITY(FEET/SEC) =   4.63   FLOW DEPTH(FEET) =    .89
 TRAVEL TIME(MIN.) =   2.34   TC(MIN.) =  20.99


****************************************************************************
 FLOW PROCESS FROM NODE   109.20 TO NODE   109.02 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.760
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =    3.00   SUBAREA RUNOFF(CFS) =    5.88
 EFFECTIVE AREA(ACRES) =   12.20
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   12.20
 PEAK FLOW RATE(CFS) =   23.92
 TC(MIN) =  20.99


****************************************************************************
 FLOW PROCESS FROM NODE   109.02 TO NODE   109.12 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1314.30   DOWNSTREAM ELEVATION =   1313.50
 STREET LENGTH(FEET) =   200.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 32.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  24.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   23.92
   STREETFLOW MODEL RESULTS:
      NOTE: STREETFLOW EXCEEDS TOP OF CURB.
      THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .69
      HALFSTREET FLOODWIDTH(FEET) =   20.37
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.42
      PRODUCT OF DEPTH&VELOCITY =    1.66
 STREETFLOW TRAVELTIME(MIN) =   1.38   TC(MIN) =  22.37

  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.657
 SOIL CLASSIFICATION IS "A"
```

```
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   12.20
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =   12.20   PEAK FLOW RATE(CFS) =     23.92
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .69   HALFSTREET FLOODWIDTH(FEET) = 20.37
 FLOW VELOCITY(FEET/SEC.) =  2.42   DEPTH*VELOCITY =   1.66


****************************************************************************
 FLOW PROCESS FROM NODE   109.30 TO NODE   109.12 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.657
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   10.00   SUBAREA RUNOFF(CFS) =   18.68
 EFFECTIVE AREA(ACRES) =   22.20
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =   22.20
 PEAK FLOW RATE(CFS) =   41.46
 TC(MIN) =  22.37


****************************************************************************
 FLOW PROCESS FROM NODE   109.12 TO NODE   109.22 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1313.50   DOWNSTREAM ELEVATION =   1311.00
 STREET LENGTH(FEET) =   350.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 32.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  24.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   41.46
   STREETFLOW MODEL RESULTS:
      NOTE: STREETFLOW EXCEEDS TOP OF CURB.
      THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .75
      HALFSTREET FLOODWIDTH(FEET) =   23.37
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.32
      PRODUCT OF DEPTH&VELOCITY =    2.47
 STREETFLOW TRAVELTIME(MIN) =   1.76   TC(MIN) =  24.13

  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.539
 SOIL CLASSIFICATION IS "A"
```

```
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   22.20
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =   22.20   PEAK FLOW RATE(CFS) =     41.46
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .75   HALFSTREET FLOODWIDTH(FEET) = 23.37
 FLOW VELOCITY(FEET/SEC.) =  3.32   DEPTH*VELOCITY =   2.47


****************************************************************************
 FLOW PROCESS FROM NODE   109.21 TO NODE   109.22 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.539
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   35.23
 EFFECTIVE AREA(ACRES) =   42.20
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =   42.20
 PEAK FLOW RATE(CFS) =   74.33
 TC(MIN) =  24.13


****************************************************************************
 FLOW PROCESS FROM NODE   109.22 TO NODE   109.23 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  36.3 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   7.3
 UPSTREAM NODE ELEVATION =  1311.00
 DOWNSTREAM NODE ELEVATION =  1309.00
 FLOWLENGTH(FEET) =   600.00   MANNINGS N =   .013
 ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =     74.33
 TRAVEL TIME(MIN.) =   1.37    TC(MIN.) =  25.50


****************************************************************************
 FLOW PROCESS FROM NODE   109.31 TO NODE   109.23 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.456
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   67.48
 EFFECTIVE AREA(ACRES) =   82.20
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =   82.20
 PEAK FLOW RATE(CFS) =  138.66
```

```
  TC(MIN) =  25.50

****************************************************************************
  FLOW PROCESS FROM NODE   109.23 TO NODE   109.23 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MINUTES) =  25.50
  RAINFALL INTENSITY (INCH./HOUR) =   2.46
  EFFECTIVE STREAM AREA(ACRES) =   82.20
  TOTAL STREAM AREA(ACRES) =   82.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    138.66

  CONFLUENCE INFORMATION:
  STREAM    PEAK FLOW    TIME    INTENSITY     FM     EFFECTIVE
  NUMBER    RATE(CFS)   (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
----------------------------------------------------------------------
    1       479.05      29.51       2.250      .58       288.45
    2       138.66      25.50       2.456      .58        82.20

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.
  SUMMARY RESULTS:
  STREAM    CONFLUENCE    EFFECTIVE
  NUMBER      Q(CFS)     AREA(ACRES)
------------------------------------------
    1       602.46        370.65
    2       603.75        331.44
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    603.75   TIME(MINUTES) =   25.500
  EFFECTIVE AREA(ACRES) =    331.44
  TOTAL AREA(ACRES) =    379.30


****************************************************************************
  FLOW PROCESS FROM NODE   109.23 TO NODE   109.24 IS CODE =   4
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
  PIPEFLOW VELOCITY(FEET/SEC.) =  23.3
  UPSTREAM NODE ELEVATION =  1309.00
  DOWNSTREAM NODE ELEVATION =  1290.00
  FLOWLENGTH(FEET) =  1350.00   MANNINGS N =  .013
  GIVEN PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    603.75
  TRAVEL TIME(MIN.) =    .97    TC(MIN.) =  26.47


****************************************************************************
  FLOW PROCESS FROM NODE  1001.00 TO NODE   109.24 IS CODE =   8
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.402
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   65.52
  EFFECTIVE AREA(ACRES) =  371.44
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =  419.30
  PEAK FLOW RATE(CFS) =  608.44
  TC(MIN) =  26.47


****************************************************************************
  FLOW PROCESS FROM NODE   109.24 TO NODE   109.24 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MINUTES) =  26.47
  RAINFALL INTENSITY (INCH./HOUR) =   2.40
  EFFECTIVE STREAM AREA(ACRES) =  371.44
  TOTAL STREAM AREA(ACRES) =  419.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    608.44


****************************************************************************
  FLOW PROCESS FROM NODE  1001.00 TO NODE   109.24 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  26.71   RAIN INTENSITY(INCH/HOUR) =  2.39
  EFFECTIVE AREA(ACRES) =    12.66
  TOTAL AREA(ACRES) =    12.66   PEAK FLOW RATE(CFS) =     20.58
  AVERAGED LOSS RATE, Fm(IN/HR) =   .582
  ***ERROR; SPECIFIED LOSS RATE, FM IS LESS THAN MINIMUM
            POSSIBLE VALUE OF   .58(INCHES/HOUR)


****************************************************************************
  FLOW PROCESS FROM NODE   109.24 TO NODE   109.24 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MINUTES) =  26.71
  RAINFALL INTENSITY (INCH./HOUR) =   2.39
  EFFECTIVE STREAM AREA(ACRES) =   12.66
  TOTAL STREAM AREA(ACRES) =   12.66
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     20.58

  CONFLUENCE INFORMATION:
  STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
```

```
  NUMBER   RATE(CFS)   (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
-----------------------------------------------------------
    1       608.44      26.47       2.402      .58       371.44
    2        20.58      26.71       2.389      .58        12.66

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.
  SUMMARY RESULTS:
  STREAM   CONFLUENCE   EFFECTIVE
  NUMBER     Q(CFS)    AREA(ACRES)
-------------------------------------------
    1       628.98       383.99
    2       624.64       384.10
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    628.98   TIME(MINUTES) =   26.468
  EFFECTIVE AREA(ACRES) =    383.99
  TOTAL AREA(ACRES) =    431.96


****************************************************************************
  FLOW PROCESS FROM NODE   109.24 TO NODE   109.30 IS CODE =   3
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  DEPTH OF FLOW IN  75.0 INCH PIPE IS  59.3 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =  24.2
  UPSTREAM NODE ELEVATION =  1290.00
  DOWNSTREAM NODE ELEVATION =  1264.00
  FLOWLENGTH(FEET) =  1300.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  75.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    628.98
  TRAVEL TIME(MIN.) =    .90    TC(MIN.) =  27.36


****************************************************************************
  FLOW PROCESS FROM NODE  1002.00 TO NODE   109.30 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.355
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   63.81
  EFFECTIVE AREA(ACRES) =  423.99
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =  471.96
  PEAK FLOW RATE(CFS) =  676.37
  TC(MIN) =  27.36


****************************************************************************
  FLOW PROCESS FROM NODE   109.30 TO NODE   109.40 IS CODE =   3
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  DEPTH OF FLOW IN  84.0 INCH PIPE IS  64.8 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =  21.2
  UPSTREAM NODE ELEVATION =  1264.00
  DOWNSTREAM NODE ELEVATION =  1244.00
  FLOWLENGTH(FEET) =  1500.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  84.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =   676.37
  TRAVEL TIME(MIN.) =   1.18    TC(MIN.) =  28.54


****************************************************************************
  FLOW PROCESS FROM NODE  1003.00 TO NODE   109.40 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.296
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   61.70
  EFFECTIVE AREA(ACRES) =  463.99
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =  511.96
  PEAK FLOW RATE(CFS) =  715.65
  TC(MIN) =  28.54


****************************************************************************
  FLOW PROCESS FROM NODE   109.40 TO NODE   109.40 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MINUTES) =  28.54
  RAINFALL INTENSITY (INCH./HOUR) =   2.30
  EFFECTIVE STREAM AREA(ACRES) =  463.99
  TOTAL STREAM AREA(ACRES) =  511.96
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    715.65

  CONFLUENCE INFORMATION:
  STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
  NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
----------------------------------------------------------------------------
    1      715.65     28.54       2.296     .58      463.99

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  1 STREAMS.
  SUMMARY RESULTS:
  STREAM   CONFLUENCE   EFFECTIVE
  NUMBER     Q(CFS)    AREA(ACRES)
-------------------------------------------
    1      715.65       463.99
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
```

```
 PEAK FLOW RATE(CFS) =    715.65   TIME(MINUTES) =   28.541
 EFFECTIVE AREA(ACRES) =    463.99
 TOTAL AREA(ACRES) =    511.96
================================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =    511.96
 EFFECTIVE AREA(ACRES) =    463.99
 PEAK FLOW RATE(CFS)    =    715.65
================================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
**********************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        Copyright 1983,86,87 Advanced Engineering Software (aes)
          Ver. 4.1C  Release Date: 5/11/87  Serial # I00908

                        Especially prepared for:

                             HALL & FOREMAN
 ************************** DESCRIPTION OF STUDY **********************
* N. FONTANA MASTER S.D. PLAN, W. FONTANA CHANNEL DESIGN, LAT. 3 ALONG
* OLEANDER DATA, Q 100 YEAR + OVERFLOW FROM BASELINE AND OLEANDER
* JN 3547
 **********************************************************************

  FILE NAME: WFONCHL3.DES
  TIME/DATE OF STUDY:  4:38   1/ 1/1980
======================================================================
  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 =
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =   .970
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) = 1.4700
  SLOPE OF INTENSITY DURATION CURVE =  .6000



**********************************************************************
  FLOW PROCESS FROM NODE   115.00 TO NODE   115.01 IS CODE =   2
----------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
======================================================================
  DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

  TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
  INITIAL SUBAREA FLOW-LENGTH =  1000.00
  UPSTREAM ELEVATION =   1408.00
  DOWNSTREAM ELEVATION =   1385.00
  ELEVATION DIFFERENCE =     23.00
  TC =  .412*[( 1000.00** 3.00)/(    23.00)]** .20 =   13.885
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.537
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA RUNOFF(CFS) =     18.88
  TOTAL AREA(ACRES) =      7.10   PEAK FLOW RATE(CFS) =     18.88
```

```
****************************************************************************
 FLOW PROCESS FROM NODE   115.01 TO NODE   115.02 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1385.00
 DOWNSTREAM NODE ELEVATION =   1369.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     18.88
 FLOW VELOCITY(FEET/SEC) =   4.43   FLOW DEPTH(FEET) =    .89
 TRAVEL TIME(MIN.) =   3.76   TC(MIN.) =  17.64


****************************************************************************
 FLOW PROCESS FROM NODE   115.10 TO NODE   115.02 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.064
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =    7.10   SUBAREA RUNOFF(CFS) =   15.86
 EFFECTIVE AREA(ACRES) =   14.20
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   14.20
 PEAK FLOW RATE(CFS) =   31.72
 TC(MIN) =  17.64


****************************************************************************
 FLOW PROCESS FROM NODE   115.02 TO NODE   116.10 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1369.00
 DOWNSTREAM NODE ELEVATION =   1354.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   700.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     31.72
 FLOW VELOCITY(FEET/SEC) =   5.71   FLOW DEPTH(FEET) =   1.08
 TRAVEL TIME(MIN.) =   2.04   TC(MIN.) =  19.69


****************************************************************************
 FLOW PROCESS FROM NODE   116.00 TO NODE   116.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.869
 SOIL CLASSIFICATION IS "A"
```

```
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     5.00   SUBAREA RUNOFF(CFS) =   10.29
 EFFECTIVE AREA(ACRES) =   19.20
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =    19.20
 PEAK FLOW RATE(CFS) =   39.51
 TC(MIN) =  19.69


****************************************************************************
 FLOW PROCESS FROM NODE   116.10 TO NODE   117.10 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1354.00   DOWNSTREAM ELEVATION =   1352.00
 STREET LENGTH(FEET) =   320.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

       **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   39.51
 ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS:
       NOTE: STREETFLOW EXCEEDS TOP OF CURB.
       THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .73
       HALFSTREET FLOODWIDTH(FEET) =   20.00
       AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.43
       PRODUCT OF DEPTH&VELOCITY =    2.49
 STREETFLOW TRAVELTIME(MIN) =   1.56   TC(MIN) =  21.24

  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.741
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   19.20
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =   19.20   PEAK FLOW RATE(CFS) =     39.51
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .73   HALFSTREET FLOODWIDTH(FEET) = 20.00
 FLOW VELOCITY(FEET/SEC.) =  3.43   DEPTH*VELOCITY =   2.49


****************************************************************************
 FLOW PROCESS FROM NODE   117.00 TO NODE   117.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.741
```

```
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   19.00   SUBAREA RUNOFF(CFS) =   36.91
 EFFECTIVE AREA(ACRES) =   38.20
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   38.20
 PEAK FLOW RATE(CFS) =   74.22
 TC(MIN) =  21.24


****************************************************************************
 FLOW PROCESS FROM NODE   117.10 TO NODE   118.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  38.4 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   6.9
 UPSTREAM NODE ELEVATION =  1352.00
 DOWNSTREAM NODE ELEVATION =  1350.00
 FLOWLENGTH(FEET) =   680.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    74.22
 TRAVEL TIME(MIN.) =   1.65    TC(MIN.) =  22.89


****************************************************************************
 FLOW PROCESS FROM NODE   118.00 TO NODE   118.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.621
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   41.00   SUBAREA RUNOFF(CFS) =   75.23
 EFFECTIVE AREA(ACRES) =   79.20
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   79.20
 PEAK FLOW RATE(CFS) =  145.32
 TC(MIN) =  22.89


****************************************************************************
 FLOW PROCESS FROM NODE   118.10 TO NODE   118.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  22.89
 RAINFALL INTENSITY (INCH./HOUR) =   2.62
 EFFECTIVE STREAM AREA(ACRES) =   79.20
 TOTAL STREAM AREA(ACRES) =   79.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    145.32
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    213.10 TO NODE    213.10 IS CODE =    7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  18.60   RAIN INTENSITY(INCH/HOUR) =  2.97
  EFFECTIVE AREA(ACRES) =    44.70
  TOTAL AREA(ACRES) =    44.70   PEAK FLOW RATE(CFS) =     93.00
  AVERAGED LOSS RATE, Fm(IN/HR) =   .582
  ***ERROR; SPECIFIED LOSS RATE, FM IS LESS THAN MINIMUM
            POSSIBLE VALUE OF   .66(INCHES/HOUR)


****************************************************************************
  FLOW PROCESS FROM NODE    213.10 TO NODE    118.10 IS CODE =    6
----------------------------------------------------------------------------
  >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM ELEVATION =   1403.00   DOWNSTREAM ELEVATION =   1350.00
  STREET LENGTH(FEET) =  2760.00   CURB HEIGTH(INCHES) = 8.
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
  INTERIOR STREET CROSSFALL(DECIMAL) =   .020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

        **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   93.00
  ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS:
        NOTE: STREETFLOW EXCEEDS TOP OF CURB.
        THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .79
        HALFSTREET FLOODWIDTH(FEET) =   20.00
        AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.70
        PRODUCT OF DEPTH&VELOCITY =    5.27
  STREETFLOW TRAVELTIME(MIN) =   6.86   TC(MIN) =  25.46

   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.458
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
  EFFECTIVE AREA(ACRES) =   44.70
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =   44.70   PEAK FLOW RATE(CFS) =     93.00
  END OF SUBAREA STREETFLOW HYDRAULICS:
  DEPTH(FEET) =  .79   HALFSTREET FLOODWIDTH(FEET) = 20.00
  FLOW VELOCITY(FEET/SEC.) =  6.70   DEPTH*VELOCITY =   5.27


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

```
 FLOW PROCESS FROM NODE   118.10 TO NODE   118.10 IS CODE =   1
----------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
======================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MINUTES) =  25.46
 RAINFALL INTENSITY (INCH./HOUR) =   2.46
 EFFECTIVE STREAM AREA(ACRES) =   44.70
 TOTAL STREAM AREA(ACRES) =   44.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     93.00

 CONFLUENCE INFORMATION:
 STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
 NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
----------------------------------------------------------------
   1      145.32     22.89       2.621     .58       79.20
   2       93.00     25.46       2.458     .58       44.70

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.
 SUMMARY RESULTS:
 STREAM   CONFLUENCE   EFFECTIVE
 NUMBER     Q(CFS)    AREA(ACRES)
-----------------------------------------
   1      236.15       119.38
   2      226.75       123.90
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    236.15   TIME(MINUTES) =   22.890
 EFFECTIVE AREA(ACRES) =    119.38
 TOTAL AREA(ACRES) =    123.90


**********************************************************************
 FLOW PROCESS FROM NODE   118.10 TO NODE   113.10 IS CODE =   3
----------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
======================================================================
 DEPTH OF FLOW IN  54.0 INCH PIPE IS  41.0 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  18.2
 UPSTREAM NODE ELEVATION =  1350.00
 DOWNSTREAM NODE ELEVATION =  1303.00
 FLOWLENGTH(FEET) =  2650.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    236.15
 TRAVEL TIME(MIN.) =   2.42    TC(MIN.) =  25.31


**********************************************************************
 FLOW PROCESS FROM NODE   113.10 TO NODE   113.10 IS CODE =   1
----------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
======================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
```

```
 TIME OF CONCENTRATION(MINUTES) =  25.31
 RAINFALL INTENSITY (INCH./HOUR) =   2.47
 EFFECTIVE STREAM AREA(ACRES) =  119.38
 TOTAL STREAM AREA(ACRES) =  123.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    236.15


****************************************************************************
 FLOW PROCESS FROM NODE   110.00 TO NODE   110.10 IS CODE =   2
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH =  1000.00
 UPSTREAM ELEVATION =   1356.00
 DOWNSTREAM ELEVATION =   1335.00
 ELEVATION DIFFERENCE =     21.00
 TC =  .412*[( 1000.00** 3.00)/(    21.00)]** .20 =   14.140
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.499
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA RUNOFF(CFS) =     19.69
 TOTAL AREA(ACRES) =      7.50   PEAK FLOW RATE(CFS) =     19.69


****************************************************************************
 FLOW PROCESS FROM NODE   110.10 TO NODE   110.20 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1335.00
 DOWNSTREAM NODE ELEVATION =   1319.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     19.69
 FLOW VELOCITY(FEET/SEC) =   4.62   FLOW DEPTH(FEET) =    .89
 TRAVEL TIME(MIN.) =   3.60   TC(MIN.) =  17.74


****************************************************************************
 FLOW PROCESS FROM NODE   111.00 TO NODE   110.20 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.053
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =    7.50   SUBAREA RUNOFF(CFS) =   16.68
 EFFECTIVE AREA(ACRES) =   15.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   15.00
```

```
  PEAK FLOW RATE(CFS) =   33.36
  TC(MIN) =  17.74

****************************************************************************
  FLOW PROCESS FROM NODE   111.20 TO NODE   111.10 IS CODE =   5
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION =   1319.00
  DOWNSTREAM NODE ELEVATION =   1309.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   650.00
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
  MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     33.36
  FLOW VELOCITY(FEET/SEC) =   5.13   FLOW DEPTH(FEET) =   1.20
  TRAVEL TIME(MIN.) =   2.11   TC(MIN.) =  19.86

****************************************************************************
  FLOW PROCESS FROM NODE   111.20 TO NODE   111.10 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.854
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =    5.30   SUBAREA RUNOFF(CFS) =   10.84
  EFFECTIVE AREA(ACRES) =   20.30
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =   20.30
  PEAK FLOW RATE(CFS) =   41.51
  TC(MIN) =  19.86

****************************************************************************
  FLOW PROCESS FROM NODE   111.10 TO NODE   112.10 IS CODE =   3
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.0 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =   9.4
  UPSTREAM NODE ELEVATION =  1309.00
  DOWNSTREAM NODE ELEVATION =  1306.00
  FLOWLENGTH(FEET) =   320.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =     41.51
  TRAVEL TIME(MIN.) =    .57    TC(MIN.) =  20.42

****************************************************************************
  FLOW PROCESS FROM NODE   112.00 TO NODE   112.10 IS CODE =   8
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.806
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   40.04
  EFFECTIVE AREA(ACRES) =   40.30
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =   40.30
  PEAK FLOW RATE(CFS) =   80.67
  TC(MIN) =  20.42


**************************************************************************
  FLOW PROCESS FROM NODE   112.10 TO NODE   113.10 IS CODE =   3
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  33.9 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =   8.5
  UPSTREAM NODE ELEVATION =  1306.00
  DOWNSTREAM NODE ELEVATION =  1303.00
  FLOWLENGTH(FEET) =   650.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =   80.67
  TRAVEL TIME(MIN.) =   1.28    TC(MIN.) =  21.70


**************************************************************************
  FLOW PROCESS FROM NODE   113.00 TO NODE   113.10 IS CODE =   8
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.706
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   76.47
  EFFECTIVE AREA(ACRES) =   80.30
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =   80.30
  PEAK FLOW RATE(CFS) =  153.51
  TC(MIN) =  21.70


**************************************************************************
  FLOW PROCESS FROM NODE   113.10 TO NODE   113.10 IS CODE =   1
--------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==========================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MINUTES) =  21.70
  RAINFALL INTENSITY (INCH./HOUR) =   2.71
  EFFECTIVE STREAM AREA(ACRES) =   80.30
```

```
 TOTAL STREAM AREA(ACRES) =   80.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    153.51

 CONFLUENCE INFORMATION:
 STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
 NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
-----------------------------------------------------------
   1      236.15     25.31      2.467     .58      119.38
   2      153.51     21.70      2.706     .58       80.30

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.
 SUMMARY RESULTS:
 STREAM   CONFLUENCE   EFFECTIVE
 NUMBER     Q(CFS)    AREA(ACRES)
-------------------------------------
   1      372.39       199.68
   2      381.59       182.64
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    381.59   TIME(MINUTES) =   21.700
 EFFECTIVE AREA(ACRES) =    182.64
 TOTAL AREA(ACRES) =    204.20


****************************************************************************
 FLOW PROCESS FROM NODE   113.10 TO NODE  1500.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  63.0 INCH PIPE IS  50.4 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  20.6
 UPSTREAM NODE ELEVATION =  1303.00
 DOWNSTREAM NODE ELEVATION =  1282.00
 FLOWLENGTH(FEET) =  1150.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    381.59
 TRAVEL TIME(MIN.) =    .93    TC(MIN.) =  22.63


****************************************************************************
 FLOW PROCESS FROM NODE  1500.00 TO NODE  1500.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.639
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   74.04
 EFFECTIVE AREA(ACRES) =  222.64
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  244.20
 PEAK FLOW RATE(CFS) =  412.09
 TC(MIN) =  22.63
```

```
**************************************************************************
 FLOW PROCESS FROM NODE  1500.10 TO NODE  1500.10 IS CODE =   1
--------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  22.63
 RAINFALL INTENSITY (INCH./HOUR) =   2.64
 EFFECTIVE STREAM AREA(ACRES) =  222.64
 TOTAL STREAM AREA(ACRES) =  244.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    412.09


**************************************************************************
 FLOW PROCESS FROM NODE  1500.10 TO NODE  1500.10 IS CODE =   7
--------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
==========================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  22.70   RAIN INTENSITY(INCH/HOUR) =  2.63
 EFFECTIVE AREA(ACRES) =    12.10
 TOTAL AREA(ACRES) =    12.10   PEAK FLOW RATE(CFS) =     21.84
 AVERAGED LOSS RATE, Fm(IN/HR) =   .582
 ***ERROR; SPECIFIED LOSS RATE, FM IS LESS THAN MINIMUM
           POSSIBLE VALUE OF   .63(INCHES/HOUR)


**************************************************************************
 FLOW PROCESS FROM NODE  1500.10 TO NODE  1500.10 IS CODE =   1
--------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==========================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MINUTES) =  22.70
 RAINFALL INTENSITY (INCH./HOUR) =   2.63
 EFFECTIVE STREAM AREA(ACRES) =   12.10
 TOTAL STREAM AREA(ACRES) =   12.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     21.84

 CONFLUENCE INFORMATION:
 STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
 NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
--------------------------------------------------------------------------
   1      412.09     22.63       2.639     .58      222.64
   2       21.84     22.70       2.634     .58       12.10

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.
 SUMMARY RESULTS:
 STREAM   CONFLUENCE   EFFECTIVE
 NUMBER     Q(CFS)    AREA(ACRES)
-------------------------------------------
   1      433.92       234.70
```

```
  2      432.98        234.74
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    433.92   TIME(MINUTES) =   22.632
 EFFECTIVE AREA(ACRES) =    234.70
 TOTAL AREA(ACRES) =    256.30


****************************************************************************
 FLOW PROCESS FROM NODE  1500.10 TO NODE  1504.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  69.0 INCH PIPE IS  53.7 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  20.0
 UPSTREAM NODE ELEVATION =  1282.00
 DOWNSTREAM NODE ELEVATION =  1259.00
 FLOWLENGTH(FEET) =  1500.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    433.92
 TRAVEL TIME(MIN.) =   1.25    TC(MIN.) =  23.88


****************************************************************************
 FLOW PROCESS FROM NODE  1501.00 TO NODE  1504.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.555
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   46.00   SUBAREA RUNOFF(CFS) =   81.68
 EFFECTIVE AREA(ACRES) =  280.70
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  302.30
 PEAK FLOW RATE(CFS) =  498.41
 TC(MIN) =  23.88


****************************************************************************
 FLOW PROCESS FROM NODE  1504.10 TO NODE  1505.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  75.0 INCH PIPE IS  58.1 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  19.5
 UPSTREAM NODE ELEVATION =  1259.00
 DOWNSTREAM NODE ELEVATION =  1240.00
 FLOWLENGTH(FEET) =  1450.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  75.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    498.41
 TRAVEL TIME(MIN.) =   1.24    TC(MIN.) =  25.12
```

```
**********************************************************************
 FLOW PROCESS FROM NODE  1505.00 TO NODE  1505.10 IS CODE =   8
----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.479
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   68.28
 EFFECTIVE AREA(ACRES) =  320.70
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  342.30
 PEAK FLOW RATE(CFS) =  547.42
 TC(MIN) =  25.12


**********************************************************************
 FLOW PROCESS FROM NODE  1505.10 TO NODE  1505.10 IS CODE =   1
----------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
======================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  25.12
 RAINFALL INTENSITY (INCH./HOUR) =   2.48
 EFFECTIVE STREAM AREA(ACRES) =  320.70
 TOTAL STREAM AREA(ACRES) =  342.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    547.42

 CONFLUENCE INFORMATION:
 STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
 NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
----------------------------------------------------------------------
   1      547.42     25.12       2.479     .58       320.70

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  1 STREAMS.
 SUMMARY RESULTS:
 STREAM   CONFLUENCE   EFFECTIVE
 NUMBER     Q(CFS)    AREA(ACRES)
--------------------------------------------
   1      547.42       320.70
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    547.42   TIME(MINUTES) =   25.119
 EFFECTIVE AREA(ACRES) =    320.70
 TOTAL AREA(ACRES) =    342.30
======================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =    342.30
 EFFECTIVE AREA(ACRES) =    320.70
 PEAK FLOW RATE(CFS)    =    547.42
======================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        Copyright 1983,86,87 Advanced Engineering Software (aes)
           Ver. 4.1C  Release Date: 5/11/87  Serial # I00908

                        Especially prepared for:

                           HALL & FOREMAN
 ************************** DESCRIPTION OF STUDY **********************
* N. FONTANA MASTER S.D. PLAN, W. FONTANA CHANNEL LAT. 4, ALONG CITRUS
* Q 100 YEAR DESIGN + OVERFLOW FROM BASELINE
* JN 3547
 **************************************************************************

  FILE NAME: WFONT4R2.DES
  TIME/DATE OF STUDY:  4:53   1/ 1/1980
==========================================================================
  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 =
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =   .970
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) = 1.4700
  SLOPE OF INTENSITY DURATION CURVE =  .6000



**************************************************************************
  FLOW PROCESS FROM NODE   119.00 TO NODE   119.01 IS CODE =   2
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

  TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
  INITIAL SUBAREA FLOW-LENGTH =  1000.00
  UPSTREAM ELEVATION =   1403.00
  DOWNSTREAM ELEVATION =   1382.00
  ELEVATION DIFFERENCE =     21.00
  TC =  .412*[( 1000.00** 3.00)/(    21.00)]** .20 =   14.140
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.499
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA RUNOFF(CFS) =     19.69
  TOTAL AREA(ACRES) =      7.50   PEAK FLOW RATE(CFS) =     19.69
```

```
****************************************************************************
 FLOW PROCESS FROM NODE   119.01 TO NODE   119.02 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1382.00
 DOWNSTREAM NODE ELEVATION =   1363.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     19.69
 FLOW VELOCITY(FEET/SEC) =   4.86   FLOW DEPTH(FEET) =    .86
 TRAVEL TIME(MIN.) =   3.43   TC(MIN.) =  17.57


****************************************************************************
 FLOW PROCESS FROM NODE   119.10 TO NODE   119.02 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.071
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =    7.50   SUBAREA RUNOFF(CFS) =   16.80
 EFFECTIVE AREA(ACRES) =   15.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   15.00
 PEAK FLOW RATE(CFS) =   33.60
 TC(MIN) =  17.57


****************************************************************************
 FLOW PROCESS FROM NODE   119.02 TO NODE   119.12 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1363.00
 DOWNSTREAM NODE ELEVATION =   1348.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =   750.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     33.60
 FLOW VELOCITY(FEET/SEC) =   5.58   FLOW DEPTH(FEET) =   1.14
 TRAVEL TIME(MIN.) =   2.24   TC(MIN.) =  19.81


****************************************************************************
 FLOW PROCESS FROM NODE   119.20 TO NODE   119.12 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.858
 SOIL CLASSIFICATION IS "A"
```

```
 RESIDENTIAL-> 5-7 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .4
 SUBAREA AREA(ACRES) =    5.30   SUBAREA RUNOFF(CFS) =   11.32
 EFFECTIVE AREA(ACRES) =   20.30
 AVERAGED Fm(INCH/HR) =   .557
 TOTAL AREA(ACRES) =   20.30
 PEAK FLOW RATE(CFS) =   42.04
 TC(MIN) =  19.81


****************************************************************************
 FLOW PROCESS FROM NODE   119.12 TO NODE   119.22 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1348.50   DOWNSTREAM ELEVATION =   1346.80
 STREET LENGTH(FEET) =   400.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   42.04
 ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS:
      NOTE: STREETFLOW EXCEEDS TOP OF CURB.
      THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .79
      HALFSTREET FLOODWIDTH(FEET) =   20.00
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.03
      PRODUCT OF DEPTH&VELOCITY =    2.38
 STREETFLOW TRAVELTIME(MIN) =   2.20   TC(MIN) =  22.01

  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.683
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   20.30
 AVERAGED Fm(INCH/HR) =   .557
 TOTAL AREA(ACRES) =   20.30   PEAK FLOW RATE(CFS) =     42.04
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .79   HALFSTREET FLOODWIDTH(FEET) = 20.00
 FLOW VELOCITY(FEET/SEC.) =  3.03   DEPTH*VELOCITY =   2.38


****************************************************************************
 FLOW PROCESS FROM NODE   119.21 TO NODE   119.22 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.683
```

```
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   37.81
 EFFECTIVE AREA(ACRES) =   40.30
 AVERAGED Fm(INCH/HR) =   .569
 TOTAL AREA(ACRES) =   40.30
 PEAK FLOW RATE(CFS) =   76.66
 TC(MIN) =  22.01


****************************************************************************
 FLOW PROCESS FROM NODE   119.22 TO NODE   119.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  34.5 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   7.9
 UPSTREAM NODE ELEVATION =  1346.80
 DOWNSTREAM NODE ELEVATION =  1344.00
 FLOWLENGTH(FEET) =   700.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    76.66
 TRAVEL TIME(MIN.) =   1.47    TC(MIN.) =  23.48


****************************************************************************
 FLOW PROCESS FROM NODE   119.31 TO NODE   119.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.581
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   71.95
 EFFECTIVE AREA(ACRES) =   80.30
 AVERAGED Fm(INCH/HR) =   .576
 TOTAL AREA(ACRES) =   80.30
 PEAK FLOW RATE(CFS) =  144.91
 TC(MIN) =  23.48


****************************************************************************
 FLOW PROCESS FROM NODE   119.10 TO NODE   119.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  23.48
 RAINFALL INTENSITY (INCH./HOUR) =   2.58
 EFFECTIVE STREAM AREA(ACRES) =   80.30
 TOTAL STREAM AREA(ACRES) =   80.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    144.91
```

```
**************************************************************************
 FLOW PROCESS FROM NODE   214.10 TO NODE   214.10 IS CODE =   7
--------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
==========================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  18.60   RAIN INTENSITY(INCH/HOUR) =  2.97
 EFFECTIVE AREA(ACRES) =    48.30
 TOTAL AREA(ACRES) =    48.30   PEAK FLOW RATE(CFS) =     95.70
 AVERAGED LOSS RATE, Fm(IN/HR) =   .582
 ***ERROR; SPECIFIED LOSS RATE, FM IS LESS THAN MINIMUM
           POSSIBLE VALUE OF   .77(INCHES/HOUR)


**************************************************************************
 FLOW PROCESS FROM NODE   214.10 TO NODE   119.10 IS CODE =   6
--------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
 UPSTREAM ELEVATION =   1395.00   DOWNSTREAM ELEVATION =   1344.00
 STREET LENGTH(FEET) =  2800.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 32.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  24.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   95.70
   STREETFLOW MODEL RESULTS:
      NOTE: STREETFLOW EXCEEDS TOP OF CURB.
      THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .82
      HALFSTREET FLOODWIDTH(FEET) =   27.12
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.87
      PRODUCT OF DEPTH&VELOCITY =    4.82
 STREETFLOW TRAVELTIME(MIN) =   7.95   TC(MIN) =  26.55

  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.398
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   48.30
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   48.30   PEAK FLOW RATE(CFS) =     95.70
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .82   HALFSTREET FLOODWIDTH(FEET) = 27.12
 FLOW VELOCITY(FEET/SEC.) =  5.87   DEPTH*VELOCITY =   4.82


**************************************************************************
 FLOW PROCESS FROM NODE   119.10 TO NODE   119.10 IS CODE =   1
```

```
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
========================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MINUTES) =  26.55
  RAINFALL INTENSITY (INCH./HOUR) =   2.40
  EFFECTIVE STREAM AREA(ACRES) =   48.30
  TOTAL STREAM AREA(ACRES) =   48.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     95.70

  CONFLUENCE INFORMATION:
  STREAM    PEAK FLOW    TIME    INTENSITY     FM     EFFECTIVE
  NUMBER    RATE(CFS)   (MIN.) (INCH/HOUR)  (IN/HR) AREA(ACRES)
------------------------------------------------------------------
    1       144.91      23.48       2.581      .58        80.30
    2        95.70      26.55       2.398      .58        48.30

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.
  SUMMARY RESULTS:
  STREAM    CONFLUENCE    EFFECTIVE
  NUMBER      Q(CFS)     AREA(ACRES)
-----------------------------------------------
    1       238.10        123.03
    2       227.39        128.60
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    238.10   TIME(MINUTES) =   23.485
  EFFECTIVE AREA(ACRES) =    123.03
  TOTAL AREA(ACRES) =    128.60


************************************************************************
  FLOW PROCESS FROM NODE   119.10 TO NODE   114.10 IS CODE =   3
------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  41.3 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =  18.2
  UPSTREAM NODE ELEVATION =  1344.00
  DOWNSTREAM NODE ELEVATION =  1297.00
  FLOWLENGTH(FEET) =  2650.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    238.10
  TRAVEL TIME(MIN.) =   2.42    TC(MIN.) =  25.91


************************************************************************
  FLOW PROCESS FROM NODE   114.10 TO NODE   114.10 IS CODE =   1
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
========================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MINUTES) =  25.91
```

```
 RAINFALL INTENSITY (INCH./HOUR) =   2.43
 EFFECTIVE STREAM AREA(ACRES) =  123.03
 TOTAL STREAM AREA(ACRES) =  128.60
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    238.10


****************************************************************************
 FLOW PROCESS FROM NODE   114.00 TO NODE   114.01 IS CODE =   2
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH =  1000.00
 UPSTREAM ELEVATION =   1350.00
 DOWNSTREAM ELEVATION =   1330.00
 ELEVATION DIFFERENCE =     20.00
 TC =  .412*[( 1000.00** 3.00)/(    20.00)]** .20 =   14.279
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.479
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA RUNOFF(CFS) =     19.55
 TOTAL AREA(ACRES) =      7.50   PEAK FLOW RATE(CFS) =     19.55


****************************************************************************
 FLOW PROCESS FROM NODE   114.01 TO NODE   114.02 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1330.00
 DOWNSTREAM NODE ELEVATION =   1313.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     19.55
 FLOW VELOCITY(FEET/SEC) =   4.59   FLOW DEPTH(FEET) =    .89
 TRAVEL TIME(MIN.) =   3.63   TC(MIN.) =  17.91


****************************************************************************
 FLOW PROCESS FROM NODE   114.20 TO NODE   114.02 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.036
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =    7.50   SUBAREA RUNOFF(CFS) =   16.57
 EFFECTIVE AREA(ACRES) =   15.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   15.00
 PEAK FLOW RATE(CFS) =   33.14
```

```
 TC(MIN) =  17.91

****************************************************************************
 FLOW PROCESS FROM NODE   114.02 TO NODE   114.12 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1313.00
 DOWNSTREAM NODE ELEVATION =   1301.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =   680.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     33.14
 FLOW VELOCITY(FEET/SEC) =   5.29   FLOW DEPTH(FEET) =   1.17
 TRAVEL TIME(MIN.) =   2.14   TC(MIN.) =  20.05


****************************************************************************
 FLOW PROCESS FROM NODE   114.30 TO NODE   114.12 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.837
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(IN
 SUBAREA AREA(ACRES) =    5.30   SUBAREA RUNOFF(CFS) =
 EFFECTIVE AREA(ACRES) =   20.30
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   20.30
 PEAK FLOW RATE(CFS) =   41.21
 TC(MIN) =  20.05


****************************************************************************
 FLOW PROCESS FROM NODE   114.12 TO NODE   114.22 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1301.50   DOWNSTREAM ELEVATION =   1299.80
 STREET LENGTH(FEET) =   380.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   41.21
 ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS:
      NOTE: STREETFLOW EXCEEDS TOP OF CURB.
      THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =    .77
        HALFSTREET FLOODWIDTH(FEET) =   20.00
        AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.15
        PRODUCT OF DEPTH&VELOCITY =    2.41
 STREETFLOW TRAVELTIME(MIN) =   2.01   TC(MIN) =  22.06

  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.679
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   20.30
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =   20.30   PEAK FLOW RATE(CFS) =     41.21
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .77   HALFSTREET FLOODWIDTH(FEET) = 20.00
 FLOW VELOCITY(FEET/SEC.) =  3.15   DEPTH*VELOCITY =   2.41


****************************************************************************
 FLOW PROCESS FROM NODE   114.11 TO NODE   114.22 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.679
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   37.75
 EFFECTIVE AREA(ACRES) =   40.30
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   40.30
 PEAK FLOW RATE(CFS) =   76.07
 TC(MIN) =  22.06


****************************************************************************
 FLOW PROCESS FROM NODE   114.22 TO NODE   114.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  34.9 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   7.8
 UPSTREAM NODE ELEVATION =  1299.80
 DOWNSTREAM NODE ELEVATION =  1297.00
 FLOWLENGTH(FEET) =   730.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =     76.07
 TRAVEL TIME(MIN.) =   1.56    TC(MIN.) =  23.63


****************************************************************************
 FLOW PROCESS FROM NODE   114.31 TO NODE   114.10 IS CODE =   8
----------------------------------------------------------------------------
```

```
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.571
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   71.62
EFFECTIVE AREA(ACRES) =   80.30
AVERAGED Fm(INCH/HR) =   .582
TOTAL AREA(ACRES) =   80.30
PEAK FLOW RATE(CFS) =  143.77
TC(MIN) =  23.63


****************************************************************************
FLOW PROCESS FROM NODE   114.10 TO NODE   114.10 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MINUTES) =  23.63
RAINFALL INTENSITY (INCH./HOUR) =   2.57
EFFECTIVE STREAM AREA(ACRES) =   80.30
TOTAL STREAM AREA(ACRES) =   80.30
PEAK FLOW RATE(CFS) AT CONFLUENCE =    143.77

CONFLUENCE INFORMATION:
STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
----------------------------------------------------------------
  1      238.10     25.91       2.433     .58      123.03
  2      143.77     23.63       2.571     .58       80.30

RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
CONFLUENCE FORMULA USED FOR  2 STREAMS.
SUMMARY RESULTS:
STREAM   CONFLUENCE   EFFECTIVE
NUMBER     Q(CFS)    AREA(ACRES)
-----------------------------------------
  1      371.88       203.33
  2      377.10       192.50
COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =    377.10   TIME(MINUTES) =   23.627
EFFECTIVE AREA(ACRES) =    192.50
TOTAL AREA(ACRES) =    208.90


****************************************************************************
FLOW PROCESS FROM NODE   114.10 TO NODE   114.20 IS CODE =   3
----------------------------------------------------------------------------
>>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
DEPTH OF FLOW IN  66.0 INCH PIPE IS  48.6 INCHES
PIPEFLOW VELOCITY(FEET/SEC.) =  20.1
```

```
 UPSTREAM NODE ELEVATION =  1297.00
 DOWNSTREAM NODE ELEVATION =  1283.00
 FLOWLENGTH(FEET) =   840.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   377.10
 TRAVEL TIME(MIN.) =    .70    TC(MIN.) =  24.32

****************************************************************************
 FLOW PROCESS FROM NODE  2001.00 TO NODE   114.20 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.527
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   28.00   SUBAREA RUNOFF(CFS) =   49.01
 EFFECTIVE AREA(ACRES) =  220.50
 AVERAGED Fm(INCH/HR) =   .580
 TOTAL AREA(ACRES) =  236.90
 PEAK FLOW RATE(CFS) =  386.40
 TC(MIN) =  24.32

****************************************************************************
 FLOW PROCESS FROM NODE   114.20 TO NODE   452.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  66.0 INCH PIPE IS  48.9 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  20.5
 UPSTREAM NODE ELEVATION =  1283.00
 DOWNSTREAM NODE ELEVATION =  1264.00
 FLOWLENGTH(FEET) =  1100.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   386.40
 TRAVEL TIME(MIN.) =    .89    TC(MIN.) =  25.22

****************************************************************************
 FLOW PROCESS FROM NODE  2002.00 TO NODE   452.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.473
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   37.00   SUBAREA RUNOFF(CFS) =   62.96
 EFFECTIVE AREA(ACRES) =  257.50
 AVERAGED Fm(INCH/HR) =   .580
 TOTAL AREA(ACRES) =  273.90
 PEAK FLOW RATE(CFS) =  438.61
 TC(MIN) =  25.22
```

```
**********************************************************************
 FLOW PROCESS FROM NODE   452.50 TO NODE   452.10 IS CODE =   8
----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.473
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   27.00   SUBAREA RUNOFF(CFS) =   45.95
 EFFECTIVE AREA(ACRES) =  284.50
 AVERAGED Fm(INCH/HR) =   .580
 TOTAL AREA(ACRES) =  300.90
 PEAK FLOW RATE(CFS) =  484.56
 TC(MIN) =  25.22


**********************************************************************
 FLOW PROCESS FROM NODE   452.10 TO NODE   452.10 IS CODE =   1
----------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
======================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  25.22
 RAINFALL INTENSITY (INCH./HOUR) =   2.47
 EFFECTIVE STREAM AREA(ACRES) =  284.50
 TOTAL STREAM AREA(ACRES) =  300.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    484.56


**********************************************************************
 FLOW PROCESS FROM NODE   452.10 TO NODE   452.10 IS CODE =   7
----------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
======================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  25.34   RAIN INTENSITY(INCH/HOUR) =  2.47
 EFFECTIVE AREA(ACRES) =    11.71
 TOTAL AREA(ACRES) =    11.71   PEAK FLOW RATE(CFS) =     19.85
 AVERAGED LOSS RATE, Fm(IN/HR) =   .582
 ***ERROR; SPECIFIED LOSS RATE, FM IS LESS THAN MINIMUM
           POSSIBLE VALUE OF   .58(INCHES/HOUR)


**********************************************************************
 FLOW PROCESS FROM NODE   452.10 TO NODE   452.10 IS CODE =   1
----------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
======================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MINUTES) =  25.34
 RAINFALL INTENSITY (INCH./HOUR) =   2.47
 EFFECTIVE STREAM AREA(ACRES) =   11.71
 TOTAL STREAM AREA(ACRES) =   11.71
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     19.85
```

```
**********************************************************************
 FLOW PROCESS FROM NODE   452.10 TO NODE   452.10 IS CODE =   7
----------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
======================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  25.34   RAIN INTENSITY(INCH/HOUR) =  2.47
 EFFECTIVE AREA(ACRES) =     8.54
 TOTAL AREA(ACRES) =     8.54   PEAK FLOW RATE(CFS) =     14.49
 AVERAGED LOSS RATE, Fm(IN/HR) =   .582


**********************************************************************
 FLOW PROCESS FROM NODE   452.10 TO NODE   452.10 IS CODE =   1
----------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
======================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION(MINUTES) =  25.34
 RAINFALL INTENSITY (INCH./HOUR) =   2.47
 EFFECTIVE STREAM AREA(ACRES) =    8.54
 TOTAL STREAM AREA(ACRES) =    8.54
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     14.49

 CONFLUENCE INFORMATION:
 STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
 NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
----------------------------------------------------------------------
   1      484.56     25.22       2.473     .58      284.50
   2       19.85     25.34       2.466     .58       11.71
   3       14.49     25.34       2.466     .58        8.54

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  3 STREAMS.
 SUMMARY RESULTS:
 STREAM   CONFLUENCE   EFFECTIVE
 NUMBER     Q(CFS)    AREA(ACRES)
-------------------------------------------
   1      518.86       304.65
   2      517.06       304.75
   3      517.06       304.75
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    518.86   TIME(MINUTES) =   25.218
 EFFECTIVE AREA(ACRES) =    304.65
 TOTAL AREA(ACRES) =    321.15


**********************************************************************
 FLOW PROCESS FROM NODE   452.10 TO NODE   114.30 IS CODE =   3
----------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
================================================================================
  DEPTH OF FLOW IN  75.0 INCH PIPE IS  55.6 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =  21.3
  UPSTREAM NODE ELEVATION =  1264.00
  DOWNSTREAM NODE ELEVATION =  1253.00
  FLOWLENGTH(FEET) =   700.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  75.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    518.86
  TRAVEL TIME(MIN.) =    .55    TC(MIN.) =  25.77


****************************************************************************
  FLOW PROCESS FROM NODE  2002.10 TO NODE   114.30 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.441
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   23.00   SUBAREA RUNOFF(CFS) =   38.48
  EFFECTIVE AREA(ACRES) =  327.65
  AVERAGED Fm(INCH/HR) =   .581
  TOTAL AREA(ACRES) =  344.15
  PEAK FLOW RATE(CFS) =  548.64
  TC(MIN) =  25.77


****************************************************************************
  FLOW PROCESS FROM NODE   114.30 TO NODE   114.31 IS CODE =   4
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
  DEPTH OF FLOW IN  60.0 INCH PIPE IS   7.2 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =   7.7
  UPSTREAM NODE ELEVATION =  1253.00
  DOWNSTREAM NODE ELEVATION =  1233.00
  FLOWLENGTH(FEET) =  1150.00   MANNINGS N =  .013
  GIVEN PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =  54
  PIPEFLOW THRU SUBAREA(CFS) =    548.64
  TRAVEL TIME(MIN.) =   2.50    TC(MIN.) =  28.27


****************************************************************************
  FLOW PROCESS FROM NODE   114.31 TO NODE   114.40 IS CODE =   4
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
  PIPEFLOW VELOCITY(FEET/SEC.) =  34.5
  UPSTREAM NODE ELEVATION =  1233.00
  DOWNSTREAM NODE ELEVATION =  1226.40
  FLOWLENGTH(FEET) =   300.00   MANNINGS N =  .013
  GIVEN PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    548.64
```

```
 TRAVEL TIME(MIN.) =     .14    TC(MIN.) =  28.42

****************************************************************************
 FLOW PROCESS FROM NODE  2003.00 TO NODE   114.40 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.302
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   53.00   SUBAREA RUNOFF(CFS) =   82.04
 EFFECTIVE AREA(ACRES) =  380.65
 AVERAGED Fm(INCH/HR) =   .581
 TOTAL AREA(ACRES) =  397.15
 PEAK FLOW RATE(CFS) =  589.63
 TC(MIN) =  28.42


****************************************************************************
 FLOW PROCESS FROM NODE   114.40 TO NODE   114.40 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  28.42
 RAINFALL INTENSITY (INCH./HOUR) =  2.30
 EFFECTIVE STREAM AREA(ACRES) =  380.65
 TOTAL STREAM AREA(ACRES) =  397.15
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    589.63

 CONFLUENCE INFORMATION:
 STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
 NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
----------------------------------------------------------------------------
   1      589.63     28.42       2.302     .58      380.65

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  1 STREAMS.
 SUMMARY RESULTS:
 STREAM   CONFLUENCE   EFFECTIVE
 NUMBER     Q(CFS)    AREA(ACRES)
--------------------------------------------
   1      589.63       380.65
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    589.63   TIME(MINUTES) =   28.415
 EFFECTIVE AREA(ACRES) =    380.65
 TOTAL AREA(ACRES) =    397.15
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =    397.15
 EFFECTIVE AREA(ACRES) =    380.65
 PEAK FLOW RATE(CFS)    =    589.63
============================================================================
```

END OF RATIONAL METHOD ANALYSIS

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        Copyright 1983,86,87 Advanced Engineering Software (aes)
           Ver. 4.1C  Release Date: 5/11/87  Serial # I00908

                        Especially prepared for:

                             HALL & FOREMAN
 *************************** DESCRIPTION OF STUDY ************************
* N. FONTANA MASTER S.D. PLAN, W. FONTANA CHANNEL DESIGN LAT. 5 ALONG
* TOKAY AVE., Q 100 YEAR + OVERFLOW FROM BASELINE
* JN 3547
 **************************************************************************

  FILE NAME: WFONCHL5.DES
  TIME/DATE OF STUDY:  5: 0   1/ 1/1980
==========================================================================
  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 =
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =   .970
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) = 1.4700
  SLOPE OF INTENSITY DURATION CURVE =  .6000



**************************************************************************
  FLOW PROCESS FROM NODE   125.00 TO NODE  125.01 IS CODE =   2
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

  TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
  INITIAL SUBAREA FLOW-LENGTH =  1000.00
  UPSTREAM ELEVATION =   1395.00
  DOWNSTREAM ELEVATION =   1375.00
  ELEVATION DIFFERENCE =     20.00
  TC =  .412*[( 1000.00** 3.00)/(    20.00)]** .20 =   14.279
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.479
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA RUNOFF(CFS) =     19.55
  TOTAL AREA(ACRES) =      7.50   PEAK FLOW RATE(CFS) =     19.55
```

```
****************************************************************************
 FLOW PROCESS FROM NODE   125.01 TO NODE   126.01 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1375.00
 DOWNSTREAM NODE ELEVATION =   1355.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     19.55
 FLOW VELOCITY(FEET/SEC) =   4.82   FLOW DEPTH(FEET) =    .86
 TRAVEL TIME(MIN.) =   3.46   TC(MIN.) =  17.74


****************************************************************************
 FLOW PROCESS FROM NODE   126.00 TO NODE   126.01 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.054
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =    7.50   SUBAREA RUNOFF(CFS) =   16.69
 EFFECTIVE AREA(ACRES) =   15.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   15.00
 PEAK FLOW RATE(CFS) =   33.37
 TC(MIN) =  17.74


****************************************************************************
 FLOW PROCESS FROM NODE   126.01 TO NODE   126.10 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1355.00
 DOWNSTREAM NODE ELEVATION =   1342.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   650.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     33.37
 FLOW VELOCITY(FEET/SEC) =   5.76   FLOW DEPTH(FEET) =   1.11
 TRAVEL TIME(MIN.) =   1.88   TC(MIN.) =  19.61


****************************************************************************
 FLOW PROCESS FROM NODE   125.12 TO NODE   126.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.875
 SOIL CLASSIFICATION IS "A"
```

```
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     5.00   SUBAREA RUNOFF(CFS) =   10.32
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =   20.00
 PEAK FLOW RATE(CFS) =   41.28
 TC(MIN) =  19.61


****************************************************************************
 FLOW PROCESS FROM NODE   126.10 TO NODE   127.10 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1342.00   DOWNSTREAM ELEVATION =   1341.00
 STREET LENGTH(FEET) =   350.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

       **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   41.28
 ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS:
       NOTE: STREETFLOW EXCEEDS TOP OF CURB.
       THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .82
       HALFSTREET FLOODWIDTH(FEET) =   20.00
       AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.67
       PRODUCT OF DEPTH&VELOCITY =    2.21
 STREETFLOW TRAVELTIME(MIN) =   2.18   TC(MIN) =  21.80

  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.699
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =   20.00   PEAK FLOW RATE(CFS) =     41.28
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .82   HALFSTREET FLOODWIDTH(FEET) = 20.00
 FLOW VELOCITY(FEET/SEC.) =  2.67   DEPTH*VELOCITY =   2.21


****************************************************************************
 FLOW PROCESS FROM NODE   127.00 TO NODE   127.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.699
```

```
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   38.10
 EFFECTIVE AREA(ACRES) =   40.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   40.00
 PEAK FLOW RATE(CFS) =   76.21
 TC(MIN) =  21.80


****************************************************************************
 FLOW PROCESS FROM NODE   127.10 TO NODE   128.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  45.0 INCH PIPE IS  33.2 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   8.7
 UPSTREAM NODE ELEVATION =  1341.00
 DOWNSTREAM NODE ELEVATION =  1337.50
 FLOWLENGTH(FEET) =   670.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    76.21
 TRAVEL TIME(MIN.) =   1.28    TC(MIN.) =  23.08


****************************************************************************
 FLOW PROCESS FROM NODE   128.21 TO NODE   128.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.608
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   72.93
 EFFECTIVE AREA(ACRES) =   80.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   80.00
 PEAK FLOW RATE(CFS) =  145.87
 TC(MIN) =  23.08


****************************************************************************
 FLOW PROCESS FROM NODE   128.10 TO NODE   129.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  42.7 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  10.2
 UPSTREAM NODE ELEVATION =  1337.50
 DOWNSTREAM NODE ELEVATION =  1334.00
 FLOWLENGTH(FEET) =   670.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   145.87
```

```
 TRAVEL TIME(MIN.) =    1.09     TC(MIN.) =  24.17

****************************************************************************
 FLOW PROCESS FROM NODE    129.00 TO NODE    129.10 IS CODE =    8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.537
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =    40.00   SUBAREA RUNOFF(CFS) =    70.37
 EFFECTIVE AREA(ACRES) =  120.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =  120.00
 PEAK FLOW RATE(CFS) =  211.10
 TC(MIN) =  24.17

****************************************************************************
 FLOW PROCESS FROM NODE    129.10 TO NODE    129.10 IS CODE =    1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  24.17
 RAINFALL INTENSITY (INCH./HOUR) =   2.54
 EFFECTIVE STREAM AREA(ACRES) =  120.00
 TOTAL STREAM AREA(ACRES) =  120.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    211.10

****************************************************************************
 FLOW PROCESS FROM NODE    221.20 TO NODE    221.20 IS CODE =    7
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  18.70   RAIN INTENSITY(INCH/HOUR) =  2.96
 EFFECTIVE AREA(ACRES) =    68.50
 TOTAL AREA(ACRES) =    68.50   PEAK FLOW RATE(CFS) =    134.80
 AVERAGED LOSS RATE, Fm(IN/HR) =    .582
 ***ERROR; SPECIFIED LOSS RATE, FM IS LESS THAN MINIMUM
           POSSIBLE VALUE OF   .77(INCHES/HOUR)

****************************************************************************
 FLOW PROCESS FROM NODE    221.20 TO NODE    129.10 IS CODE =    6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =    1385.00   DOWNSTREAM ELEVATION =    1334.00
 STREET LENGTH(FEET) =  2650.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 20.00
```

```
 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

       **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =  134.80
 ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS:
       NOTE: STREETFLOW EXCEEDS TOP OF CURB.
       THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .88
       HALFSTREET FLOODWIDTH(FEET) =  20.00
       AVERAGE FLOW VELOCITY(FEET/SEC.) =   7.58
       PRODUCT OF DEPTH&VELOCITY =   6.70
 STREETFLOW TRAVELTIME(MIN) =  5.83   TC(MIN) =  24.53

  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.514
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =  68.50
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  68.50   PEAK FLOW RATE(CFS) =   134.80
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .88   HALFSTREET FLOODWIDTH(FEET) = 20.00
 FLOW VELOCITY(FEET/SEC.) =  7.58   DEPTH*VELOCITY =  6.70


****************************************************************
 FLOW PROCESS FROM NODE   129.10 TO NODE   129.10 IS CODE =   1
----------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MINUTES) =  24.53
 RAINFALL INTENSITY (INCH./HOUR) =   2.51
 EFFECTIVE STREAM AREA(ACRES) =   68.50
 TOTAL STREAM AREA(ACRES) =   68.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =   134.80

 CONFLUENCE INFORMATION:
 STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
 NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
----------------------------------------------------------------
   1      211.10     24.17       2.537     .58      120.00
   2      134.80     24.53       2.514     .58       68.50

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.
 SUMMARY RESULTS:
 STREAM   CONFLUENCE   EFFECTIVE
```

```
  NUMBER     Q(CFS)     AREA(ACRES)
-----------------------------------------
    1       345.47        187.50
    2       343.50        188.50
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    345.47   TIME(MINUTES) =   24.168
  EFFECTIVE AREA(ACRES) =    187.50
  TOTAL AREA(ACRES) =    188.50


****************************************************************************
  FLOW PROCESS FROM NODE   129.10 TO NODE   124.10 IS CODE =   3
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  DEPTH OF FLOW IN  63.0 INCH PIPE IS  47.8 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =  19.6
  UPSTREAM NODE ELEVATION =  1334.00
  DOWNSTREAM NODE ELEVATION =  1288.00
  FLOWLENGTH(FEET) =  2750.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    345.47
  TRAVEL TIME(MIN.) =   2.34    TC(MIN.) =  26.51


****************************************************************************
  FLOW PROCESS FROM NODE   124.10 TO NODE   124.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MINUTES) =  26.51
  RAINFALL INTENSITY (INCH./HOUR) =   2.40
  EFFECTIVE STREAM AREA(ACRES) =  187.50
  TOTAL STREAM AREA(ACRES) =  188.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    345.47


****************************************************************************
  FLOW PROCESS FROM NODE   120.00 TO NODE   120.01 IS CODE =   2
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

  TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
  INITIAL SUBAREA FLOW-LENGTH =  1000.00
  UPSTREAM ELEVATION =   1344.00
  DOWNSTREAM ELEVATION =   1325.00
  ELEVATION DIFFERENCE =     19.00
  TC =  .412*[( 1000.00** 3.00)/(    19.00)]** .20 =   14.426
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.457
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
```

```
 SUBAREA RUNOFF(CFS) =     19.41
 TOTAL AREA(ACRES) =      7.50   PEAK FLOW RATE(CFS) =     19.41

****************************************************************************
 FLOW PROCESS FROM NODE   120.01 TO NODE   120.02 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1325.00
 DOWNSTREAM NODE ELEVATION =   1308.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     19.41
 FLOW VELOCITY(FEET/SEC) =   4.56   FLOW DEPTH(FEET) =    .89
 TRAVEL TIME(MIN.) =   3.66   TC(MIN.) =  18.08


****************************************************************************
 FLOW PROCESS FROM NODE   120.12 TO NODE   120.02 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.019
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =    7.50   SUBAREA RUNOFF(CFS) =   16.45
 EFFECTIVE AREA(ACRES) =   15.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   15.00
 PEAK FLOW RATE(CFS) =   32.90
 TC(MIN) =  18.08


****************************************************************************
 FLOW PROCESS FROM NODE   120.02 TO NODE   121.10 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1308.00
 DOWNSTREAM NODE ELEVATION =   1296.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   320.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     32.90
 FLOW VELOCITY(FEET/SEC) =   7.04   FLOW DEPTH(FEET) =    .95
 TRAVEL TIME(MIN.) =    .76   TC(MIN.) =  18.84


****************************************************************************
 FLOW PROCESS FROM NODE   121.00 TO NODE   121.10 IS CODE =   8
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.945
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =    5.00   SUBAREA RUNOFF(CFS) =   10.64
  EFFECTIVE AREA(ACRES) =   20.00
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =   20.00
  PEAK FLOW RATE(CFS) =   42.54
  TC(MIN) =  18.84


****************************************************************************
  FLOW PROCESS FROM NODE   121.10 TO NODE   122.10 IS CODE =   6
----------------------------------------------------------------------------
  >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  UPSTREAM ELEVATION =   1296.00   DOWNSTREAM ELEVATION =   1295.00
  STREET LENGTH(FEET) =   320.00   CURB HEIGTH(INCHES) = 8.
  STREET HALFWIDTH(FEET) = 32.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  24.00
  INTERIOR STREET CROSSFALL(DECIMAL) =   .020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

       **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   42.54
    STREETFLOW MODEL RESULTS:
       NOTE: STREETFLOW EXCEEDS TOP OF CURB.
       THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .84
       HALFSTREET FLOODWIDTH(FEET) =   27.87
       AVERAGE FLOW VELOCITY(FEET/SEC.) =   2.48
       PRODUCT OF DEPTH&VELOCITY =   2.08
  STREETFLOW TRAVELTIME(MIN) =   2.15   TC(MIN) =  20.99

   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.761
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
  EFFECTIVE AREA(ACRES) =   20.00
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =   20.00   PEAK FLOW RATE(CFS) =     42.54
  END OF SUBAREA STREETFLOW HYDRAULICS:
  DEPTH(FEET) =  .84   HALFSTREET FLOODWIDTH(FEET) = 27.87
  FLOW VELOCITY(FEET/SEC.) =  2.48   DEPTH*VELOCITY =   2.08


****************************************************************************
  FLOW PROCESS FROM NODE   122.00 TO NODE   122.10 IS CODE =   8
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.761
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   39.22
  EFFECTIVE AREA(ACRES) =   40.00
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =   40.00
  PEAK FLOW RATE(CFS) =   78.44
  TC(MIN) =  20.99


****************************************************************************
  FLOW PROCESS FROM NODE   122.10 TO NODE   123.10 IS CODE =   3
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  31.3 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =  10.2
  UPSTREAM NODE ELEVATION =  1295.00
  DOWNSTREAM NODE ELEVATION =  1290.00
  FLOWLENGTH(FEET) =   640.00   MANNINGS N =   .013
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    78.44
  TRAVEL TIME(MIN.) =   1.05    TC(MIN.) =  22.03


****************************************************************************
  FLOW PROCESS FROM NODE   123.00 TO NODE   123.10 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.681
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   75.58
  EFFECTIVE AREA(ACRES) =   80.00
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =   80.00
  PEAK FLOW RATE(CFS) =  151.16
  TC(MIN) =  22.03


****************************************************************************
  FLOW PROCESS FROM NODE   123.10 TO NODE   124.10 IS CODE =   3
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  DEPTH OF FLOW IN  63.0 INCH PIPE IS  48.3 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =   8.5
  UPSTREAM NODE ELEVATION =  1290.00
  DOWNSTREAM NODE ELEVATION =  1288.00
```

```
 FLOWLENGTH(FEET) =   640.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    151.16
 TRAVEL TIME(MIN.) =   1.26    TC(MIN.) =  23.29

****************************************************************************
 FLOW PROCESS FROM NODE   124.00 TO NODE   124.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.594
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   72.42
 EFFECTIVE AREA(ACRES) =  120.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  120.00
 PEAK FLOW RATE(CFS) =  217.26
 TC(MIN) =  23.29

****************************************************************************
 FLOW PROCESS FROM NODE   124.10 TO NODE   124.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MINUTES) =  23.29
 RAINFALL INTENSITY (INCH./HOUR) =   2.59
 EFFECTIVE STREAM AREA(ACRES) =  120.00
 TOTAL STREAM AREA(ACRES) =  120.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    217.26

 CONFLUENCE INFORMATION:
 STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
 NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
----------------------------------------------------------------------------
   1      345.47     26.51       2.400     .58       187.50
   2      217.26     23.29       2.594     .58       120.00

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.
 SUMMARY RESULTS:
 STREAM   CONFLUENCE   EFFECTIVE
 NUMBER     Q(CFS)    AREA(ACRES)
--------------------------------------------
   1      541.81       307.50
   2      553.15       284.75
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    553.15   TIME(MINUTES) =   23.290
 EFFECTIVE AREA(ACRES) =    284.75
 TOTAL AREA(ACRES) =    308.50
```

```
****************************************************************************
 FLOW PROCESS FROM NODE   124.10 TO NODE   124.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  23.29
 RAINFALL INTENSITY (INCH./HOUR) =   2.59
 EFFECTIVE STREAM AREA(ACRES) =  284.75
 TOTAL STREAM AREA(ACRES) =  308.50
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    553.15


****************************************************************************
 FLOW PROCESS FROM NODE   129.10 TO NODE   129.10 IS CODE =   7
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  24.17   RAIN INTENSITY(INCH/HOUR) =  2.54
 EFFECTIVE AREA(ACRES) =    37.60
 TOTAL AREA(ACRES) =    37.60   PEAK FLOW RATE(CFS) =     66.10
 AVERAGED LOSS RATE, Fm(IN/HR) =   .582
 ***ERROR; SPECIFIED LOSS RATE, FM IS LESS THAN MINIMUM
           POSSIBLE VALUE OF   .58(INCHES/HOUR)


****************************************************************************
 FLOW PROCESS FROM NODE   129.10 TO NODE   124.10 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1334.00   DOWNSTREAM ELEVATION =   1288.00
 STREET LENGTH(FEET) =  1750.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

       **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   66.10
 ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS:
       NOTE: STREETFLOW EXCEEDS TOP OF CURB.
       THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .71
       HALFSTREET FLOODWIDTH(FEET) =   20.00
       AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.15
       PRODUCT OF DEPTH&VELOCITY =    4.35
 STREETFLOW TRAVELTIME(MIN) =   4.74   TC(MIN) =  28.91
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.278
SOIL CLASSIFICATION IS "A"
RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
EFFECTIVE AREA(ACRES) =   37.60
AVERAGED Fm(INCH/HR) =    .582
TOTAL AREA(ACRES) =   37.60   PEAK FLOW RATE(CFS) =     66.10
END OF SUBAREA STREETFLOW HYDRAULICS:
DEPTH(FEET) =  .71   HALFSTREET FLOODWIDTH(FEET) = 20.00
FLOW VELOCITY(FEET/SEC.) =  6.15   DEPTH*VELOCITY =   4.35


****************************************************************************
FLOW PROCESS FROM NODE   124.10 TO NODE   124.10 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MINUTES) =  28.91
RAINFALL INTENSITY (INCH./HOUR) =   2.28
EFFECTIVE STREAM AREA(ACRES) =   37.60
TOTAL STREAM AREA(ACRES) =   37.60
PEAK FLOW RATE(CFS) AT CONFLUENCE =     66.10


****************************************************************************
FLOW PROCESS FROM NODE   124.10 TO NODE    24.10 IS CODE =   7
----------------------------------------------------------------------------
>>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
USER-SPECIFIED VALUES ARE AS FOLLOWS:
TC(MIN) =  24.34   RAIN INTENSITY(INCH/HOUR) =  2.53
EFFECTIVE AREA(ACRES) =    36.50
TOTAL AREA(ACRES) =    36.50   PEAK FLOW RATE(CFS) =     63.90
AVERAGED LOSS RATE, Fm(IN/HR) =   .582


****************************************************************************
FLOW PROCESS FROM NODE   124.10 TO NODE   124.10 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
TIME OF CONCENTRATION(MINUTES) =  24.34
RAINFALL INTENSITY (INCH./HOUR) =   2.53
EFFECTIVE STREAM AREA(ACRES) =   36.50
TOTAL STREAM AREA(ACRES) =   36.50
PEAK FLOW RATE(CFS) AT CONFLUENCE =     63.90

CONFLUENCE INFORMATION:
STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
----------------------------------------------------------
```

```
    1       553.15      23.29       2.594      .58       284.75
    2        66.10      28.91       2.278      .58        37.60
    3        63.90      24.34       2.526      .58        36.50

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.
  SUMMARY RESULTS:
  STREAM    CONFLUENCE    EFFECTIVE
  NUMBER      Q(CFS)     AREA(ACRES)
-----------------------------------------
    1       679.57        349.96
    2       588.19        358.85
    3       662.20        352.90
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    679.57   TIME(MINUTES) =   23.290
  EFFECTIVE AREA(ACRES) =    349.96
  TOTAL AREA(ACRES) =    382.60


****************************************************************************
  FLOW PROCESS FROM NODE   124.10 TO NODE   450.10 IS CODE =   3
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  DEPTH OF FLOW IN  81.0 INCH PIPE IS  63.5 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =  22.6
  UPSTREAM NODE ELEVATION =  1288.00
  DOWNSTREAM NODE ELEVATION =  1273.00
  FLOWLENGTH(FEET) =   950.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  81.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    679.57
  TRAVEL TIME(MIN.) =    .70    TC(MIN.) =  23.99


****************************************************************************
  FLOW PROCESS FROM NODE   450.00 TO NODE   450.10 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.548
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   16.40   SUBAREA RUNOFF(CFS) =   29.02
  EFFECTIVE AREA(ACRES) =  366.36
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =  399.00
  PEAK FLOW RATE(CFS) =  679.57
  TC(MIN) =  23.99


****************************************************************************
  FLOW PROCESS FROM NODE   450.10 TO NODE   450.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
==========================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MINUTES) =  23.99
  RAINFALL INTENSITY (INCH./HOUR) =   2.55
  EFFECTIVE STREAM AREA(ACRES) =  366.36
  TOTAL STREAM AREA(ACRES) =  399.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    679.57


**************************************************************************
  FLOW PROCESS FROM NODE   450.10 TO NODE   450.10 IS CODE =   7
--------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
==========================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  25.13   RAIN INTENSITY(INCH/HOUR) =  2.48
  EFFECTIVE AREA(ACRES) =     5.00
  TOTAL AREA(ACRES) =     5.00   PEAK FLOW RATE(CFS) =     25.13
  AVERAGED LOSS RATE, Fm(IN/HR) =   .582


**************************************************************************
  FLOW PROCESS FROM NODE   450.10 TO NODE   450.10 IS CODE =   1
--------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==========================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MINUTES) =  25.13
  RAINFALL INTENSITY (INCH./HOUR) =   2.48
  EFFECTIVE STREAM AREA(ACRES) =    5.00
  TOTAL STREAM AREA(ACRES) =    5.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     25.13

  CONFLUENCE INFORMATION:
  STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
  NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
--------------------------------------------------------------------------
    1      679.57     23.99       2.548     .58      366.36
    2       25.13     25.13       2.478     .58        5.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.
  SUMMARY RESULTS:
  STREAM   CONFLUENCE   EFFECTIVE
  NUMBER     Q(CFS)    AREA(ACRES)
--------------------------------------------------
    1      704.45       371.14
    2      680.53       371.36
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    704.45   TIME(MINUTES) =   23.991
  EFFECTIVE AREA(ACRES) =    371.14
  TOTAL AREA(ACRES) =    404.00
```

```
**************************************************************************
 FLOW PROCESS FROM NODE   450.10 TO NODE   452.10 IS CODE =   4
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
==========================================================================
 PIPEFLOW VELOCITY(FEET/SEC.) =  19.7
 UPSTREAM NODE ELEVATION =  1273.00
 DOWNSTREAM NODE ELEVATION =  1266.00
 FLOWLENGTH(FEET) =  1500.00   MANNINGS N =  .013
 GIVEN PIPE DIAMETER(INCH) =  81.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    704.45
 TRAVEL TIME(MIN.) =   1.27    TC(MIN.) =  25.26


**************************************************************************
 FLOW PROCESS FROM NODE   452.00 TO NODE   452.10 IS CODE =   8
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.470
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   38.80   SUBAREA RUNOFF(CFS) =   65.94
 EFFECTIVE AREA(ACRES) =  409.94
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  442.80
 PEAK FLOW RATE(CFS) =  704.45
 TC(MIN) =  25.26


**************************************************************************
 FLOW PROCESS FROM NODE   452.10 TO NODE   452.10 IS CODE =   1
--------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  25.26
 RAINFALL INTENSITY (INCH./HOUR) =   2.47
 EFFECTIVE STREAM AREA(ACRES) =  409.94
 TOTAL STREAM AREA(ACRES) =  442.80
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    704.45


**************************************************************************
 FLOW PROCESS FROM NODE   452.10 TO NODE   452.10 IS CODE =   7
--------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
==========================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  27.11   RAIN INTENSITY(INCH/HOUR) =  2.37
 EFFECTIVE AREA(ACRES) =    12.20
 TOTAL AREA(ACRES) =    12.20   PEAK FLOW RATE(CFS) =     19.60
 AVERAGED LOSS RATE, Fm(IN/HR) =   .582
 ***ERROR; SPECIFIED LOSS RATE, FM IS LESS THAN MINIMUM
```

```
            POSSIBLE VALUE OF    .58(INCHES/HOUR)

****************************************************************************
  FLOW PROCESS FROM NODE    452.10 TO NODE    452.10 IS CODE =    1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MINUTES) =  27.11
  RAINFALL INTENSITY (INCH./HOUR) =   2.37
  EFFECTIVE STREAM AREA(ACRES) =   12.20
  TOTAL STREAM AREA(ACRES) =   12.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     19.60

  CONFLUENCE INFORMATION:
  STREAM    PEAK FLOW    TIME    INTENSITY     FM     EFFECTIVE
  NUMBER    RATE(CFS)   (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
----------------------------------------------------------------------
    1       704.45      25.26       2.470      .58       409.94
    2        19.60      27.11       2.368      .58        12.20

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.
  SUMMARY RESULTS:
  STREAM    CONFLUENCE    EFFECTIVE
  NUMBER      Q(CFS)     AREA(ACRES)
-----------------------------------------
    1       723.76        421.31
    2       685.80        422.14
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    723.76   TIME(MINUTES) =   25.261
  EFFECTIVE AREA(ACRES) =    421.31
  TOTAL AREA(ACRES) =    455.00


****************************************************************************
  FLOW PROCESS FROM NODE    452.10 TO NODE    453.10 IS CODE =    4
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
  PIPEFLOW VELOCITY(FEET/SEC.) =  20.2
  UPSTREAM NODE ELEVATION =  1266.00
  DOWNSTREAM NODE ELEVATION =  1251.00
  FLOWLENGTH(FEET) =   980.00   MANNINGS N =  .013
  GIVEN PIPE DIAMETER(INCH) =  81.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    723.76
  TRAVEL TIME(MIN.) =    .81    TC(MIN.) =  26.07


****************************************************************************
  FLOW PROCESS FROM NODE    453.00 TO NODE    453.10 IS CODE =    8
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.424
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   10.00   SUBAREA RUNOFF(CFS) =   16.58
  EFFECTIVE AREA(ACRES) =  431.31
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =  465.00
  PEAK FLOW RATE(CFS) =  723.76
  TC(MIN) =  26.07


****************************************************************************
  FLOW PROCESS FROM NODE   453.10 TO NODE   456.10 IS CODE =   3
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  DEPTH OF FLOW IN  87.0 INCH PIPE IS  65.5 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =  21.7
  UPSTREAM NODE ELEVATION =  1251.00
  DOWNSTREAM NODE ELEVATION =  1229.00
  FLOWLENGTH(FEET) =  1650.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  87.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =   723.76
  TRAVEL TIME(MIN.) =   1.27    TC(MIN.) =  27.34


****************************************************************************
  FLOW PROCESS FROM NODE   456.00 TO NODE   456.10 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.356
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   24.00   SUBAREA RUNOFF(CFS) =   38.32
  EFFECTIVE AREA(ACRES) =  455.31
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =  489.00
  PEAK FLOW RATE(CFS) =  726.92
  TC(MIN) =  27.34


****************************************************************************
  FLOW PROCESS FROM NODE   457.00 TO NODE   456.10 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.356
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   26.00   SUBAREA RUNOFF(CFS) =   41.51
  EFFECTIVE AREA(ACRES) =  481.31
```

```
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =  515.00
 PEAK FLOW RATE(CFS) =  768.43
 TC(MIN) =  27.34


****************************************************************************
 FLOW PROCESS FROM NODE   456.10 TO NODE   456.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  27.34
 RAINFALL INTENSITY (INCH./HOUR) =   2.36
 EFFECTIVE STREAM AREA(ACRES) =  481.31
 TOTAL STREAM AREA(ACRES) =  515.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    768.43

 CONFLUENCE INFORMATION:
 STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
 NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
----------------------------------------------------------------
   1      768.43     27.34       2.356     .58      481.31

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  1 STREAMS.
 SUMMARY RESULTS:
 STREAM   CONFLUENCE   EFFECTIVE
 NUMBER     Q(CFS)    AREA(ACRES)
-------------------------------------------
   1      768.43       481.31
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    768.43   TIME(MINUTES) =   27.336
 EFFECTIVE AREA(ACRES) =    481.31
 TOTAL AREA(ACRES) =    515.00
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =    515.00
 EFFECTIVE AREA(ACRES) =    481.31
 PEAK FLOW RATE(CFS)    =    768.43
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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          Ver. 4.1C  Release Date: 5/11/87  Serial # I00908

                        Especially prepared for:

                           HALL & FOREMAN
 *************************** DESCRIPTION OF STUDY ***********************
* N. FONTANA MASTER S.D. PLAN, W. FONTANA CHANNEL LAT. 6
* Q 100 YEAR, NO OVERFLOW FOR THIS PORTION OF S.D.
* JN 3547
 **************************************************************************

  FILE NAME: WFONT6R.100
  TIME/DATE OF STUDY:  5:14   1/ 1/1980
==========================================================================
  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 =
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =   .970
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) = 1.4700
  SLOPE OF INTENSITY DURATION CURVE =  .6000



**************************************************************************
  FLOW PROCESS FROM NODE   454.00 TO NODE  454.10 IS CODE =   2
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

  TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
  INITIAL SUBAREA FLOW-LENGTH =  1000.00
  UPSTREAM ELEVATION =   1266.00
  DOWNSTREAM ELEVATION =   1249.00
  ELEVATION DIFFERENCE =     17.00
  TC =  .412*[( 1000.00** 3.00)/(    17.00)]** .20 =   14.751
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.411
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA RUNOFF(CFS) =     25.46
  TOTAL AREA(ACRES) =     10.00   PEAK FLOW RATE(CFS) =     25.46
```

```
****************************************************************************
 FLOW PROCESS FROM NODE   454.10 TO NODE   455.21 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1249.00   DOWNSTREAM ELEVATION =   1247.30
 STREET LENGTH(FEET) =   350.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 36.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  24.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   25.46
   STREETFLOW MODEL RESULTS:
      NOTE: STREETFLOW EXCEEDS TOP OF CURB.
      THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .71
      HALFSTREET FLOODWIDTH(FEET) =   17.62
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.71
      PRODUCT OF DEPTH&VELOCITY =    1.93
 STREETFLOW TRAVELTIME(MIN) =   2.15   TC(MIN) =  16.90

  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.144
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   10.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   10.00   PEAK FLOW RATE(CFS) =     25.46
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .71   HALFSTREET FLOODWIDTH(FEET) = 17.62
 FLOW VELOCITY(FEET/SEC.) =  2.71   DEPTH*VELOCITY =   1.93


****************************************************************************
 FLOW PROCESS FROM NODE   455.00 TO NODE   455.21 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.144
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   10.00   SUBAREA RUNOFF(CFS) =   23.06
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   20.00
 PEAK FLOW RATE(CFS) =   46.11
 TC(MIN) =  16.90
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    455.21 TO NODE    456.01 IS CODE =    3
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  29.1 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =   6.9
  UPSTREAM NODE ELEVATION =  1247.30
  DOWNSTREAM NODE ELEVATION =  1245.00
  FLOWLENGTH(FEET) =   575.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =     46.11
  TRAVEL TIME(MIN.) =   1.38    TC(MIN.) =  18.28


****************************************************************************
  FLOW PROCESS FROM NODE    456.00 TO NODE    456.01 IS CODE =    8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.999
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   43.51
  EFFECTIVE AREA(ACRES) =   40.00
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =   40.00
  PEAK FLOW RATE(CFS) =   87.02
  TC(MIN) =  18.28


****************************************************************************
  FLOW PROCESS FROM NODE    456.01 TO NODE    457.01 IS CODE =    3
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  37.6 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =   7.8
  UPSTREAM NODE ELEVATION =  1245.00
  DOWNSTREAM NODE ELEVATION =  1242.80
  FLOWLENGTH(FEET) =   630.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =     87.02
  TRAVEL TIME(MIN.) =   1.35    TC(MIN.) =  19.64


****************************************************************************
  FLOW PROCESS FROM NODE    457.00 TO NODE    457.01 IS CODE =    8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.873
  SOIL CLASSIFICATION IS "A"
```

```
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   28.00   SUBAREA RUNOFF(CFS) =   57.74
 EFFECTIVE AREA(ACRES) =   68.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   68.00
 PEAK FLOW RATE(CFS) =  140.23
 TC(MIN) =  19.64

****************************************************************************
 FLOW PROCESS FROM NODE   457.01 TO NODE   455.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  41.9 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  10.0
 UPSTREAM NODE ELEVATION =  1242.80
 DOWNSTREAM NODE ELEVATION =  1239.00
 FLOWLENGTH(FEET) =   750.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   140.23
 TRAVEL TIME(MIN.) =   1.24    TC(MIN.) =  20.88

****************************************************************************
 FLOW PROCESS FROM NODE   457.10 TO NODE   455.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.769
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   78.74
 EFFECTIVE AREA(ACRES) =  108.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  108.00
 PEAK FLOW RATE(CFS) =  212.61
 TC(MIN) =  20.88

****************************************************************************
 FLOW PROCESS FROM NODE   455.10 TO NODE   458.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  45.5 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  14.0
 UPSTREAM NODE ELEVATION =  1239.00
 DOWNSTREAM NODE ELEVATION =  1223.00
 FLOWLENGTH(FEET) =  1650.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   212.61
 TRAVEL TIME(MIN.) =   1.96    TC(MIN.) =  22.84
```

```
****************************************************************************
 FLOW PROCESS FROM NODE   458.00 TO NODE   458.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.624
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   78.00   SUBAREA RUNOFF(CFS) =  143.36
 EFFECTIVE AREA(ACRES) =  186.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  186.00
 PEAK FLOW RATE(CFS) =  341.85
 TC(MIN) =  22.84


****************************************************************************
 FLOW PROCESS FROM NODE   458.10 TO NODE   458.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  22.84
 RAINFALL INTENSITY (INCH./HOUR) =   2.62
 EFFECTIVE STREAM AREA(ACRES) =  186.00
 TOTAL STREAM AREA(ACRES) =  186.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    341.85
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =    186.00
 EFFECTIVE AREA(ACRES) =    186.00
 PEAK FLOW RATE(CFS)    =    341.85
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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           Ver. 4.1C  Release Date: 5/11/87  Serial # I00908

                        Especially prepared for:

                            HALL & FOREMAN
 ************************** DESCRIPTION OF STUDY ***********************
* N. FONTANA MASTER S.D. PLAN, W. FONTANA CHANNEL LAT. 7 NORTHERN PORTI
* Q 100 YEAR + OVERFLOW FROM BASELINE S.D.
* JN 3547
 **************************************************************************

  FILE NAME: WFONT7RA.100
  TIME/DATE OF STUDY:  5:49   1/ 1/1980
==========================================================================
  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 =
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =   .970
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) = 1.4700
  SLOPE OF INTENSITY DURATION CURVE =  .6000



**************************************************************************
  FLOW PROCESS FROM NODE   133.00 TO NODE   133.01 IS CODE =   2
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

  TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
  INITIAL SUBAREA FLOW-LENGTH =  1000.00
  UPSTREAM ELEVATION =   1385.00
  DOWNSTREAM ELEVATION =   1362.00
  ELEVATION DIFFERENCE =     23.00
  TC =  .412*[( 1000.00** 3.00)/(    23.00)]** .20 =   13.885
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.537
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA RUNOFF(CFS) =     19.95
  TOTAL AREA(ACRES) =      7.50   PEAK FLOW RATE(CFS) =     19.95
```

```
****************************************************************************
 FLOW PROCESS FROM NODE   133.01 TO NODE   134.01 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1362.00
 DOWNSTREAM NODE ELEVATION =   1344.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     19.95
 FLOW VELOCITY(FEET/SEC) =   4.68   FLOW DEPTH(FEET) =    .89
 TRAVEL TIME(MIN.) =   3.56   TC(MIN.) =  17.44


****************************************************************************
 FLOW PROCESS FROM NODE   134.00 TO NODE   134.01 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.085
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =    7.50   SUBAREA RUNOFF(CFS) =   16.89
 EFFECTIVE AREA(ACRES) =   15.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   15.00
 PEAK FLOW RATE(CFS) =   33.79
 TC(MIN) =  17.44


****************************************************************************
 FLOW PROCESS FROM NODE   134.01 TO NODE   134.10 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1344.00
 DOWNSTREAM NODE ELEVATION =   1332.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   670.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     33.79
 FLOW VELOCITY(FEET/SEC) =   5.40   FLOW DEPTH(FEET) =   1.17
 TRAVEL TIME(MIN.) =   2.07   TC(MIN.) =  19.51


****************************************************************************
 FLOW PROCESS FROM NODE   133.12 TO NODE   134.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.884
 SOIL CLASSIFICATION IS "A"
```

```
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     5.00   SUBAREA RUNOFF(CFS) =   10.36
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =    20.00
 PEAK FLOW RATE(CFS) =   41.44
 TC(MIN) =  19.51


****************************************************************************
 FLOW PROCESS FROM NODE   134.10 TO NODE   135.10 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1332.00   DOWNSTREAM ELEVATION =   1330.00
 STREET LENGTH(FEET) =   320.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
 INTERIOR STREET CROSSFALL(DECIMAL) =    .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =    .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

       **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   41.44
 ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS:
       NOTE: STREETFLOW EXCEEDS TOP OF CURB.
       THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .75
       HALFSTREET FLOODWIDTH(FEET) =   20.00
       AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.37
       PRODUCT OF DEPTH&VELOCITY =    2.51
 STREETFLOW TRAVELTIME(MIN) =   1.58   TC(MIN) =  21.10

  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.752
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =   20.00   PEAK FLOW RATE(CFS) =     41.44
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .75   HALFSTREET FLOODWIDTH(FEET) = 20.00
 FLOW VELOCITY(FEET/SEC.) =  3.37   DEPTH*VELOCITY =   2.51


****************************************************************************
 FLOW PROCESS FROM NODE   135.00 TO NODE   135.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.752
```

```
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   39.06
  EFFECTIVE AREA(ACRES) =   40.00
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =   40.00
  PEAK FLOW RATE(CFS) =   78.13
  TC(MIN) =  21.10


****************************************************************************
  FLOW PROCESS FROM NODE   135.10 TO NODE   135.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MINUTES) =  21.10
  RAINFALL INTENSITY (INCH./HOUR) =   2.75
  EFFECTIVE STREAM AREA(ACRES) =   40.00
  TOTAL STREAM AREA(ACRES) =   40.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     78.13


****************************************************************************
  FLOW PROCESS FROM NODE   221.10 TO NODE   221.10 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  18.60   RAIN INTENSITY(INCH/HOUR) =  2.97
  EFFECTIVE AREA(ACRES) =    19.70
  TOTAL AREA(ACRES) =    19.70   PEAK FLOW RATE(CFS) =     44.10
  AVERAGED LOSS RATE, Fm(IN/HR) =   .582


****************************************************************************
  FLOW PROCESS FROM NODE   221.10 TO NODE   135.10 IS CODE =   6
----------------------------------------------------------------------------
  >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM ELEVATION =   1380.00   DOWNSTREAM ELEVATION =   1330.00
  STREET LENGTH(FEET) =  2600.00   CURB HEIGTH(INCHES) = 8.
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
  INTERIOR STREET CROSSFALL(DECIMAL) =   .020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

       **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   44.10
    STREETFLOW MODEL RESULTS:
       STREET FLOWDEPTH(FEET) =   .66
       HALFSTREET FLOODWIDTH(FEET) =   18.87
       AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.07
```

```
        PRODUCT OF DEPTH&VELOCITY =     3.32
  STREETFLOW TRAVELTIME(MIN) =   8.55   TC(MIN) =  27.15

   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.365
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =      .00   SUBAREA RUNOFF(CFS) =      .00
  EFFECTIVE AREA(ACRES) =   19.70
  AVERAGED Fm(INCH/HR) =    .582
  TOTAL AREA(ACRES) =   19.70   PEAK FLOW RATE(CFS) =     44.10
  END OF SUBAREA STREETFLOW HYDRAULICS:
  DEPTH(FEET) =  .66   HALFSTREET FLOODWIDTH(FEET) = 18.87
  FLOW VELOCITY(FEET/SEC.) =  5.07   DEPTH*VELOCITY =   3.32


****************************************************************************
  FLOW PROCESS FROM NODE   135.10 TO NODE   135.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MINUTES) =  27.15
  RAINFALL INTENSITY (INCH./HOUR) =   2.37
  EFFECTIVE STREAM AREA(ACRES) =   19.70
  TOTAL STREAM AREA(ACRES) =   19.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     44.10

  CONFLUENCE INFORMATION:
  STREAM    PEAK FLOW    TIME    INTENSITY     FM     EFFECTIVE
  NUMBER    RATE(CFS)   (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
----------------------------------------------------------------------------
    1        78.13      21.10       2.752      .58        40.00
    2        44.10      27.15       2.365      .58        19.70

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.
  SUMMARY RESULTS:
  STREAM   CONFLUENCE   EFFECTIVE
  NUMBER     Q(CFS)    AREA(ACRES)
----------------------------------------------
    1       119.82        55.31
    2       108.30        59.70
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    119.82   TIME(MINUTES) =   21.097
  EFFECTIVE AREA(ACRES) =     55.31
  TOTAL AREA(ACRES) =     59.70


****************************************************************************
  FLOW PROCESS FROM NODE   135.10 TO NODE   136.10 IS CODE =   3
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  38.6 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =  10.4
  UPSTREAM NODE ELEVATION =  1330.00
  DOWNSTREAM NODE ELEVATION =  1325.50
  FLOWLENGTH(FEET) =   720.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    119.82
  TRAVEL TIME(MIN.) =   1.15    TC(MIN.) =  22.25


****************************************************************************
  FLOW PROCESS FROM NODE   136.00 TO NODE   136.10 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.666
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   75.01
  EFFECTIVE AREA(ACRES) =   95.31
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =   99.70
  PEAK FLOW RATE(CFS) =  178.73
  TC(MIN) =  22.25


****************************************************************************
  FLOW PROCESS FROM NODE   136.10 TO NODE   130.10 IS CODE =   3
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  39.0 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =  16.3
  UPSTREAM NODE ELEVATION =  1325.50
  DOWNSTREAM NODE ELEVATION =  1280.00
  FLOWLENGTH(FEET) =  2750.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    178.73
  TRAVEL TIME(MIN.) =   2.81    TC(MIN.) =  25.06


****************************************************************************
  FLOW PROCESS FROM NODE   130.10 TO NODE   130.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MINUTES) =  25.06
  RAINFALL INTENSITY (INCH./HOUR) =   2.48
  EFFECTIVE STREAM AREA(ACRES) =   95.31
  TOTAL STREAM AREA(ACRES) =   99.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    178.73
```

```
  CONFLUENCE INFORMATION:
  STREAM    PEAK FLOW    TIME    INTENSITY     FM     EFFECTIVE
  NUMBER    RATE(CFS)   (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
-----------------------------------------------------------------
    1       178.73      25.06       2.482     .58        95.31

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  1 STREAMS.
  SUMMARY RESULTS:
  STREAM    CONFLUENCE    EFFECTIVE
  NUMBER      Q(CFS)     AREA(ACRES)
-----------------------------------------------
    1       178.73         95.31
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    178.73   TIME(MINUTES) =   25.056
  EFFECTIVE AREA(ACRES) =     95.31
  TOTAL AREA(ACRES) =      99.70
=================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =     99.70
  EFFECTIVE AREA(ACRES) =     95.31
  PEAK FLOW RATE(CFS)    =    178.73
=================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        Copyright 1983,86,87 Advanced Engineering Software (aes)
          Ver. 4.1C  Release Date: 5/11/87  Serial # I00908

                        Especially prepared for:

                          HALL & FOREMAN
 ************************** DESCRIPTION OF STUDY ***********************
* N. FONTANA MASTER S.D. PLAN, W. FONTANA CHANNEL LAT. 7 SOUTH PORTION
* Q 100 YEAR + OVERFLOW FROM BASELINE S.D.
* JN 3547
 **************************************************************************

  FILE NAME: WFONT7RB.100
  TIME/DATE OF STUDY:  6: 2   1/ 1/1980
==========================================================================
  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 =
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =   .970
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) = 1.4700
  SLOPE OF INTENSITY DURATION CURVE =  .6000



**************************************************************************
  FLOW PROCESS FROM NODE   130.00 TO NODE   130.01 IS CODE =   2
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

  TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
  INITIAL SUBAREA FLOW-LENGTH =  1000.00
  UPSTREAM ELEVATION =   1334.00
  DOWNSTREAM ELEVATION =   1313.00
  ELEVATION DIFFERENCE =     21.00
  TC =  .412*[( 1000.00** 3.00)/(    21.00)]** .20 =   14.140
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.499
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA RUNOFF(CFS) =     19.69
  TOTAL AREA(ACRES) =      7.50   PEAK FLOW RATE(CFS) =     19.69
```

```
****************************************************************************
 FLOW PROCESS FROM NODE   130.01 TO NODE   130.02 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1313.00
 DOWNSTREAM NODE ELEVATION =   1297.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     19.69
 FLOW VELOCITY(FEET/SEC) =   4.62   FLOW DEPTH(FEET) =    .89
 TRAVEL TIME(MIN.) =   3.60   TC(MIN.) =  17.74


****************************************************************************
 FLOW PROCESS FROM NODE   130.10 TO NODE   130.02 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.053
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =    7.50   SUBAREA RUNOFF(CFS) =   16.68
 EFFECTIVE AREA(ACRES) =   15.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   15.00
 PEAK FLOW RATE(CFS) =   33.36
 TC(MIN) =  17.74


****************************************************************************
 FLOW PROCESS FROM NODE   130.02 TO NODE   130.12 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1297.00
 DOWNSTREAM NODE ELEVATION =   1285.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   720.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     33.36
 FLOW VELOCITY(FEET/SEC) =   5.33   FLOW DEPTH(FEET) =   1.17
 TRAVEL TIME(MIN.) =   2.25   TC(MIN.) =  20.00


****************************************************************************
 FLOW PROCESS FROM NODE   130.20 TO NODE   130.12 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.842
 SOIL CLASSIFICATION IS "A"
```

```
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     5.00   SUBAREA RUNOFF(CFS) =   10.17
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =   20.00
 PEAK FLOW RATE(CFS) =   40.68
 TC(MIN) =  20.00


****************************************************************************
 FLOW PROCESS FROM NODE   130.12 TO NODE   130.22 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1285.00   DOWNSTREAM ELEVATION =   1283.00
 STREET LENGTH(FEET) =   320.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 32.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  24.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   40.68
   STREETFLOW MODEL RESULTS:
      NOTE: STREETFLOW EXCEEDS TOP OF CURB.
      THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .75
      HALFSTREET FLOODWIDTH(FEET) =   23.37
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.25
      PRODUCT OF DEPTH&VELOCITY =    2.43
 STREETFLOW TRAVELTIME(MIN) =   1.64   TC(MIN) =  21.64

  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.711
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =   20.00   PEAK FLOW RATE(CFS) =     40.68
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .75   HALFSTREET FLOODWIDTH(FEET) = 23.37
 FLOW VELOCITY(FEET/SEC.) =  3.25   DEPTH*VELOCITY =   2.43


****************************************************************************
 FLOW PROCESS FROM NODE   130.21 TO NODE   130.22 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.711
 SOIL CLASSIFICATION IS "A"
```

```
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   38.32
 EFFECTIVE AREA(ACRES) =   40.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   40.00
 PEAK FLOW RATE(CFS) =   76.64
 TC(MIN) =  21.64


****************************************************************************
 FLOW PROCESS FROM NODE   130.22 TO NODE   130.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  45.0 INCH PIPE IS  36.1 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   8.1
 UPSTREAM NODE ELEVATION =  1283.00
 DOWNSTREAM NODE ELEVATION =  1280.00
 FLOWLENGTH(FEET) =   680.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    76.64
 TRAVEL TIME(MIN.) =   1.40    TC(MIN.) =  23.04


****************************************************************************
 FLOW PROCESS FROM NODE   130.31 TO NODE   130.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.611
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   73.03
 EFFECTIVE AREA(ACRES) =   80.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   80.00
 PEAK FLOW RATE(CFS) =  146.05
 TC(MIN) =  23.04


****************************************************************************
 FLOW PROCESS FROM NODE   130.10 TO NODE   130.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  23.04
 RAINFALL INTENSITY (INCH./HOUR) =   2.61
 EFFECTIVE STREAM AREA(ACRES) =   80.00
 TOTAL STREAM AREA(ACRES) =   80.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    146.05


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

```
 FLOW PROCESS FROM NODE   130.10 TO NODE   130.10 IS CODE =   7
----------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  25.10   RAIN INTENSITY(INCH/HOUR) =  2.48
 EFFECTIVE AREA(ACRES) =    95.31
 TOTAL AREA(ACRES) =    99.70   PEAK FLOW RATE(CFS) =    178.73
 AVERAGED LOSS RATE, Fm(IN/HR) =   .580


****************************************************************
 FLOW PROCESS FROM NODE   130.10 TO NODE   130.10 IS CODE =   1
----------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MINUTES) =  25.10
 RAINFALL INTENSITY (INCH./HOUR) =   2.48
 EFFECTIVE STREAM AREA(ACRES) =   95.31
 TOTAL STREAM AREA(ACRES) =   99.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    178.73

 CONFLUENCE INFORMATION:
 STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
 NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
----------------------------------------------------------------
   1      146.05     23.04       2.611     .58       80.00
   2      178.73     25.10       2.480     .58       95.31

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.
 SUMMARY RESULTS:
 STREAM   CONFLUENCE   EFFECTIVE
 NUMBER     Q(CFS)    AREA(ACRES)
-------------------------------------------
   1      321.40       167.49
   2      315.37       175.31
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    321.40   TIME(MINUTES) =   23.039
 EFFECTIVE AREA(ACRES) =    167.49
 TOTAL AREA(ACRES) =    179.70


****************************************************************
 FLOW PROCESS FROM NODE   130.10 TO NODE   131.10 IS CODE =   3
----------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================
 DEPTH OF FLOW IN  75.0 INCH PIPE IS  56.0 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  13.1
 UPSTREAM NODE ELEVATION =  1280.00
 DOWNSTREAM NODE ELEVATION =  1272.00
```

```
 FLOWLENGTH(FEET) =  1350.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  75.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   321.40
 TRAVEL TIME(MIN.) =   1.72    TC(MIN.) =  24.76

****************************************************************************
 FLOW PROCESS FROM NODE   131.00 TO NODE   131.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.500
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   80.00   SUBAREA RUNOFF(CFS) =  138.11
 EFFECTIVE AREA(ACRES) =  247.49
 AVERAGED Fm(INCH/HR) =   .581
 TOTAL AREA(ACRES) =  259.70
 PEAK FLOW RATE(CFS) =  427.40
 TC(MIN) =  24.76

****************************************************************************
 FLOW PROCESS FROM NODE   131.10 TO NODE   132.10 IS CODE =   4
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
 PIPEFLOW VELOCITY(FEET/SEC.) =  16.5
 UPSTREAM NODE ELEVATION =  1272.00
 DOWNSTREAM NODE ELEVATION =  1267.00
 FLOWLENGTH(FEET) =   700.00   MANNINGS N =  .013
 GIVEN PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =   427.40
 TRAVEL TIME(MIN.) =    .71    TC(MIN.) =  25.47

****************************************************************************
 FLOW PROCESS FROM NODE   132.20 TO NODE   132.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.458
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   67.54
 EFFECTIVE AREA(ACRES) =  287.49
 AVERAGED Fm(INCH/HR) =   .581
 TOTAL AREA(ACRES) =  299.70
 PEAK FLOW RATE(CFS) =  485.59
 TC(MIN) =  25.47

****************************************************************************
 FLOW PROCESS FROM NODE   132.10 TO NODE   140.10 IS CODE =   3
```

```
------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  56.4 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =  20.4
  UPSTREAM NODE ELEVATION =  1267.00
  DOWNSTREAM NODE ELEVATION =  1227.00
  FLOWLENGTH(FEET) =  2650.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    485.59
  TRAVEL TIME(MIN.) =   2.16    TC(MIN.) =  27.63


************************************************************************
  FLOW PROCESS FROM NODE   140.10 TO NODE   140.10 IS CODE =   1
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
========================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MINUTES) =  27.63
  RAINFALL INTENSITY (INCH./HOUR) =   2.34
  EFFECTIVE STREAM AREA(ACRES) =  287.49
  TOTAL STREAM AREA(ACRES) =  299.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    485.59


************************************************************************
  FLOW PROCESS FROM NODE   132.10 TO NODE   132.10 IS CODE =   7
------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
========================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  25.60   RAIN INTENSITY(INCH/HOUR) =  2.45
  EFFECTIVE AREA(ACRES) =    77.00
  TOTAL AREA(ACRES) =    77.00   PEAK FLOW RATE(CFS) =    143.70
  AVERAGED LOSS RATE, Fm(IN/HR) =   .580


************************************************************************
  FLOW PROCESS FROM NODE   132.10 TO NODE   132.10 IS CODE =   1
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
========================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MINUTES) =  25.60
  RAINFALL INTENSITY (INCH./HOUR) =   2.45
  EFFECTIVE STREAM AREA(ACRES) =   77.00
  TOTAL STREAM AREA(ACRES) =   77.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    143.70


************************************************************************
  FLOW PROCESS FROM NODE  2004.00 TO NODE  2004.01 IS CODE =   2
------------------------------------------------------------------------
```

```
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==============================================================================
  DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

  TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
  INITIAL SUBAREA FLOW-LENGTH =  1000.00
  UPSTREAM ELEVATION =   1280.00
  DOWNSTREAM ELEVATION =   1262.00
  ELEVATION DIFFERENCE =     18.00
  TC =  .412*[( 1000.00** 3.00)/(    18.00)]** .20 =   14.583
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.435
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA RUNOFF(CFS) =     19.26
  TOTAL AREA(ACRES) =      7.50   PEAK FLOW RATE(CFS) =     19.26


****************************************************************************
  FLOW PROCESS FROM NODE  2004.01 TO NODE  2004.02 IS CODE =   5
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  UPSTREAM NODE ELEVATION =   1262.00
  DOWNSTREAM NODE ELEVATION =   1244.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
  CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
  MANNINGS FACTOR =  .013   MAXIMUM DEPTH(FEET) =   2.00
  CHANNEL FLOW THRU SUBAREA(CFS) =     19.26
  FLOW VELOCITY(FEET/SEC) =   8.60   FLOW DEPTH(FEET) =    .55
  TRAVEL TIME(MIN.) =   1.94   TC(MIN.) =  16.52


****************************************************************************
  FLOW PROCESS FROM NODE  2004.10 TO NODE  2004.02 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.187
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =    7.50   SUBAREA RUNOFF(CFS) =   17.58
  EFFECTIVE AREA(ACRES) =   15.00
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =   15.00
  PEAK FLOW RATE(CFS) =   35.17
  TC(MIN) =  16.52


****************************************************************************
  FLOW PROCESS FROM NODE  2004.02 TO NODE  2004.03 IS CODE =   5
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
```

```
 UPSTREAM NODE ELEVATION =   1244.00
 DOWNSTREAM NODE ELEVATION =   1237.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   640.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     35.17
 FLOW VELOCITY(FEET/SEC) =   4.68   FLOW DEPTH(FEET) =   1.33
 TRAVEL TIME(MIN.) =   2.28   TC(MIN.) =  18.80


****************************************************************************
 FLOW PROCESS FROM NODE  2004.20 TO NODE  2004.03 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.949
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =    5.00   SUBAREA RUNOFF(CFS) =   10.65
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   20.00
 PEAK FLOW RATE(CFS) =   42.61
 TC(MIN) =  18.80


****************************************************************************
 FLOW PROCESS FROM NODE  2004.03 TO NODE  2006.10 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1237.00   DOWNSTREAM ELEVATION =   1235.00
 STREET LENGTH(FEET) =   320.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 32.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  24.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

      **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   42.61
   STREETFLOW MODEL RESULTS:
      NOTE: STREETFLOW EXCEEDS TOP OF CURB.
      THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .76
      HALFSTREET FLOODWIDTH(FEET) =   24.13
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.22
      PRODUCT OF DEPTH&VELOCITY =    2.45
 STREETFLOW TRAVELTIME(MIN) =   1.65   TC(MIN) =  20.45

  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.804
 SOIL CLASSIFICATION IS "A"
```

```
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =   20.00   PEAK FLOW RATE(CFS) =     42.61
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .76   HALFSTREET FLOODWIDTH(FEET) = 24.13
 FLOW VELOCITY(FEET/SEC.) =  3.22   DEPTH*VELOCITY =   2.45


****************************************************************************
 FLOW PROCESS FROM NODE  2006.00 TO NODE  2006.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.804
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   39.99
 EFFECTIVE AREA(ACRES) =   40.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =   40.00
 PEAK FLOW RATE(CFS) =   79.98
 TC(MIN) =  20.45


****************************************************************************
 FLOW PROCESS FROM NODE  2006.10 TO NODE  2007.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  45.0 INCH PIPE IS  36.5 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   8.3
 UPSTREAM NODE ELEVATION =  1235.00
 DOWNSTREAM NODE ELEVATION =  1232.00
 FLOWLENGTH(FEET) =   640.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =     79.98
 TRAVEL TIME(MIN.) =   1.28    TC(MIN.) =  21.73


****************************************************************************
 FLOW PROCESS FROM NODE  2007.00 TO NODE  2007.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.703
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   76.37
 EFFECTIVE AREA(ACRES) =   80.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =   80.00
 PEAK FLOW RATE(CFS) =  152.75
```

```
  TC(MIN) =  21.73

****************************************************************************
  FLOW PROCESS FROM NODE  2007.10 TO NODE   140.10 IS CODE =   3
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  40.1 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =  12.1
  UPSTREAM NODE ELEVATION =  1232.00
  DOWNSTREAM NODE ELEVATION =  1227.00
  FLOWLENGTH(FEET) =   640.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =   152.75
  TRAVEL TIME(MIN.) =    .88    TC(MIN.) =  22.62

****************************************************************************
  FLOW PROCESS FROM NODE  2008.21 TO NODE   140.10 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.640
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   74.07
  EFFECTIVE AREA(ACRES) =  120.00
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =  120.00
  PEAK FLOW RATE(CFS) =  222.21
  TC(MIN) =  22.62

****************************************************************************
  FLOW PROCESS FROM NODE   140.10 TO NODE  140.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MINUTES) =  22.62
  RAINFALL INTENSITY (INCH./HOUR) =   2.64
  EFFECTIVE STREAM AREA(ACRES) =  120.00
  TOTAL STREAM AREA(ACRES) =  120.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    222.21

  CONFLUENCE INFORMATION:
  STREAM    PEAK FLOW    TIME    INTENSITY     FM     EFFECTIVE
  NUMBER    RATE(CFS)   (MIN.)  (INCH/HOUR)  (IN/HR) AREA(ACRES)
----------------------------------------------------------------------
    1       485.59      27.63       2.341      .58      287.49
    2       143.70      25.60       2.451      .58       77.00
    3       222.21      22.62       2.640      .58      120.00
```

```
  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.
  SUMMARY RESULTS:
  STREAM    CONFLUENCE    EFFECTIVE
  NUMBER      Q(CFS)     AREA(ACRES)
-------------------------------------------
    1        810.81        484.49
    2        823.46        463.36
    3        826.99        423.37
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    826.99   TIME(MINUTES) =   22.619
  EFFECTIVE AREA(ACRES) =    423.37
  TOTAL AREA(ACRES) =    496.70


****************************************************************************
  FLOW PROCESS FROM NODE   140.10 TO NODE   140.30 IS CODE =   3
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  DEPTH OF FLOW IN  87.0 INCH PIPE IS  68.4 INCHES
  PIPEFLOW VELOCITY(FEET/SEC.) =  23.8
  UPSTREAM NODE ELEVATION =  1227.00
  DOWNSTREAM NODE ELEVATION =  1200.00
  FLOWLENGTH(FEET) =  1700.00   MANNINGS N =  .013
  ESTIMATED PIPE DIAMETER(INCH) =  87.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    826.99
  TRAVEL TIME(MIN.) =   1.19    TC(MIN.) =  23.81


****************************************************************************
  FLOW PROCESS FROM NODE  2009.00 TO NODE   140.30 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.559
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   50.00   SUBAREA RUNOFF(CFS) =   88.98
  EFFECTIVE AREA(ACRES) =  473.37
  AVERAGED Fm(INCH/HR) =   .581
  TOTAL AREA(ACRES) =  546.70
  PEAK FLOW RATE(CFS) =  842.70
  TC(MIN) =  23.81


****************************************************************************
  FLOW PROCESS FROM NODE   140.30 TO NODE   140.30 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MINUTES) =  23.81
```

```
 RAINFALL INTENSITY (INCH./HOUR) =   2.56
 EFFECTIVE STREAM AREA(ACRES) =  473.37
 TOTAL STREAM AREA(ACRES) =  546.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    842.70
================================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =    546.70
 EFFECTIVE AREA(ACRES) =    473.37
 PEAK FLOW RATE(CFS)    =    842.70
================================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        Copyright 1983,86,87 Advanced Engineering Software (aes)
          Ver. 4.1C  Release Date: 5/11/87  Serial # I00908

                        Especially prepared for:

                          HALL & FOREMAN
 ************************** DESCRIPTION OF STUDY ***********************
* N. FONTANA MASTER S.D. PLAN, W. FONTANA CHANNEL LAT. 8
* Q 100 YEAR + OVERFLOW FROM BASELINE S.D.
* JN 3547
 **************************************************************************

  FILE NAME: WFONT8RA.100
  TIME/DATE OF STUDY:  5:53   1/ 1/1980
==========================================================================
  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 =
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =   .970
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) = 1.4700
  SLOPE OF INTENSITY DURATION CURVE =  .6000



**************************************************************************
  FLOW PROCESS FROM NODE   137.00 TO NODE  137.01 IS CODE =   2
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 3-4 DWELLINGS/ACRE

  TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
  INITIAL SUBAREA FLOW-LENGTH =  1000.00
  UPSTREAM ELEVATION =   1375.00
  DOWNSTREAM ELEVATION =   1352.00
  ELEVATION DIFFERENCE =     23.00
  TC =  .412*[( 1000.00** 3.00)/(    23.00)]** .20 =   13.885
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.537
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA RUNOFF(CFS) =     19.95
  TOTAL AREA(ACRES) =      7.50   PEAK FLOW RATE(CFS) =     19.95
```

```
****************************************************************************
 FLOW PROCESS FROM NODE   137.01 TO NODE   137.02 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1352.00
 DOWNSTREAM NODE ELEVATION =   1335.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     19.95
 FLOW VELOCITY(FEET/SEC) =   4.68   FLOW DEPTH(FEET) =    .89
 TRAVEL TIME(MIN.) =   3.56   TC(MIN.) =  17.44


****************************************************************************
 FLOW PROCESS FROM NODE   137.10 TO NODE   137.02 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.085
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =    7.50   SUBAREA RUNOFF(CFS) =   16.89
 EFFECTIVE AREA(ACRES) =   15.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   15.00
 PEAK FLOW RATE(CFS) =   33.79
 TC(MIN) =  17.44


****************************************************************************
 FLOW PROCESS FROM NODE   137.02 TO NODE   132.12 IS CODE =   5
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION =   1335.00
 DOWNSTREAM NODE ELEVATION =   1323.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   630.00
 CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   2.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     33.79
 FLOW VELOCITY(FEET/SEC) =   5.61   FLOW DEPTH(FEET) =   1.14
 TRAVEL TIME(MIN.) =   1.87   TC(MIN.) =  19.31


****************************************************************************
 FLOW PROCESS FROM NODE   137.20 TO NODE   132.12 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.902
 SOIL CLASSIFICATION IS "A"
```

```
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     5.00   SUBAREA RUNOFF(CFS) =   10.44
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =    20.00
 PEAK FLOW RATE(CFS) =   41.76
 TC(MIN) =  19.31


****************************************************************************
 FLOW PROCESS FROM NODE   132.12 TO NODE   137.10 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1323.00   DOWNSTREAM ELEVATION =   1321.00
 STREET LENGTH(FEET) =   320.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

       **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   41.76
 ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS:
       NOTE: STREETFLOW EXCEEDS TOP OF CURB.
       THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .75
       HALFSTREET FLOODWIDTH(FEET) =   20.00
       AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.39
       PRODUCT OF DEPTH&VELOCITY =    2.53
 STREETFLOW TRAVELTIME(MIN) =   1.57   TC(MIN) =  20.89

  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.769
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   20.00
 AVERAGED Fm(INCH/HR) =    .582
 TOTAL AREA(ACRES) =   20.00   PEAK FLOW RATE(CFS) =     41.76
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .75   HALFSTREET FLOODWIDTH(FEET) = 20.00
 FLOW VELOCITY(FEET/SEC.) =  3.39   DEPTH*VELOCITY =   2.53


****************************************************************************
 FLOW PROCESS FROM NODE   137.21 TO NODE   137.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.769
```

```
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   20.00   SUBAREA RUNOFF(CFS) =   39.36
 EFFECTIVE AREA(ACRES) =   40.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   40.00
 PEAK FLOW RATE(CFS) =   78.72
 TC(MIN) =  20.89


****************************************************************************
 FLOW PROCESS FROM NODE   137.10 TO NODE   138.10 IS CODE =   3
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 DEPTH OF FLOW IN  45.0 INCH PIPE IS  31.5 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =   9.5
 UPSTREAM NODE ELEVATION =  1321.00
 DOWNSTREAM NODE ELEVATION =  1317.00
 FLOWLENGTH(FEET) =   630.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =     78.72
 TRAVEL TIME(MIN.) =   1.10    TC(MIN.) =  21.99


****************************************************************************
 FLOW PROCESS FROM NODE   138.00 TO NODE   138.10 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.685
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   75.69
 EFFECTIVE AREA(ACRES) =   80.00
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   80.00
 PEAK FLOW RATE(CFS) =  151.38
 TC(MIN) =  21.99


****************************************************************************
 FLOW PROCESS FROM NODE   138.10 TO NODE   138.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  21.99
 RAINFALL INTENSITY (INCH./HOUR) =   2.68
 EFFECTIVE STREAM AREA(ACRES) =   80.00
 TOTAL STREAM AREA(ACRES) =   80.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    151.38
```

```
****************************************************************************
 FLOW PROCESS FROM NODE   227.11 TO NODE   227.11 IS CODE =   7
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  18.60   RAIN INTENSITY(INCH/HOUR) =  2.97
 EFFECTIVE AREA(ACRES) =    50.70
 TOTAL AREA(ACRES) =    50.70   PEAK FLOW RATE(CFS) =     84.60
 AVERAGED LOSS RATE, Fm(IN/HR) =   .582
 ***ERROR; SPECIFIED LOSS RATE, FM IS LESS THAN MINIMUM
           POSSIBLE VALUE OF  1.11(INCHES/HOUR)


****************************************************************************
 FLOW PROCESS FROM NODE   227.11 TO NODE   138.10 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =   1365.00   DOWNSTREAM ELEVATION =   1317.00
 STREET LENGTH(FEET) =  2600.00   CURB HEIGTH(INCHES) = 8.
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
 INTERIOR STREET CROSSFALL(DECIMAL) =   .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

       **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   84.60
 ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS:
       NOTE: STREETFLOW EXCEEDS TOP OF CURB.
       THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .77
       HALFSTREET FLOODWIDTH(FEET) =   20.00
       AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.46
       PRODUCT OF DEPTH&VELOCITY =    4.95
 STREETFLOW TRAVELTIME(MIN) =   6.71   TC(MIN) =  25.31

  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.468
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   50.70
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =   50.70   PEAK FLOW RATE(CFS) =     86.04
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =  .79   HALFSTREET FLOODWIDTH(FEET) = 20.00
 FLOW VELOCITY(FEET/SEC.) =  6.20   DEPTH*VELOCITY =   4.87


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

```
 FLOW PROCESS FROM NODE   138.10 TO NODE   138.10 IS CODE =   1
----------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
======================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MINUTES) =  25.31
 RAINFALL INTENSITY (INCH./HOUR) =   2.47
 EFFECTIVE STREAM AREA(ACRES) =   50.70
 TOTAL STREAM AREA(ACRES) =   50.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     86.04

 CONFLUENCE INFORMATION:
 STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
 NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
----------------------------------------------------------------------
   1      151.38     21.99      2.685     .58       80.00
   2       86.04     25.31      2.468     .58       50.70

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.
 SUMMARY RESULTS:
 STREAM   CONFLUENCE   EFFECTIVE
 NUMBER     Q(CFS)    AREA(ACRES)
-------------------------------------------
   1      234.75       124.05
   2      221.79       130.70
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    234.75   TIME(MINUTES) =   21.990
 EFFECTIVE AREA(ACRES) =    124.05
 TOTAL AREA(ACRES) =    130.70


**********************************************************************
 FLOW PROCESS FROM NODE   138.10 TO NODE   139.11 IS CODE =   3
----------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
======================================================================
 DEPTH OF FLOW IN  63.0 INCH PIPE IS  47.2 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  13.5
 UPSTREAM NODE ELEVATION =  1317.00
 DOWNSTREAM NODE ELEVATION =  1312.00
 FLOWLENGTH(FEET) =   630.00   MANNINGS N =   .013
 ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    234.75
 TRAVEL TIME(MIN.) =    .78    TC(MIN.) =  22.77


**********************************************************************
 FLOW PROCESS FROM NODE   139.20 TO NODE   139.11 IS CODE =   8
----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.629
```

```
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   40.00   SUBAREA RUNOFF(CFS) =   73.70
  EFFECTIVE AREA(ACRES) =  164.05
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =  170.70
  PEAK FLOW RATE(CFS) =  302.25
  TC(MIN) =  22.77


****************************************************************************
  FLOW PROCESS FROM NODE   139.11 TO NODE   139.11 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MINUTES) =  22.77
  RAINFALL INTENSITY (INCH./HOUR) =   2.63
  EFFECTIVE STREAM AREA(ACRES) =  164.05
  TOTAL STREAM AREA(ACRES) =  170.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    302.25


****************************************************************************
  FLOW PROCESS FROM NODE   227.10 TO NODE   227.10 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  18.60   RAIN INTENSITY(INCH/HOUR) =  2.97
  EFFECTIVE AREA(ACRES) =    43.60
  TOTAL AREA(ACRES) =    43.60   PEAK FLOW RATE(CFS) =     99.90
  AVERAGED LOSS RATE, Fm(IN/HR) =   .582


****************************************************************************
  FLOW PROCESS FROM NODE   227.10 TO NODE   139.11 IS CODE =   6
----------------------------------------------------------------------------
  >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM ELEVATION =   1362.00   DOWNSTREAM ELEVATION =   1312.00
  STREET LENGTH(FEET) =  2600.00   CURB HEIGTH(INCHES) = 8.
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  12.00
  INTERIOR STREET CROSSFALL(DECIMAL) =   .020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =   .040

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

        **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =   99.90
  ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS:
        NOTE: STREETFLOW EXCEEDS TOP OF CURB.
        THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =   .81
        HALFSTREET FLOODWIDTH(FEET) =   20.00
        AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.82
        PRODUCT OF DEPTH&VELOCITY =    5.49
  STREETFLOW TRAVELTIME(MIN) =   6.36   TC(MIN) =  24.96

   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.488
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =     .00   SUBAREA RUNOFF(CFS) =     .00
  EFFECTIVE AREA(ACRES) =   43.60
  AVERAGED Fm(INCH/HR) =   .582
  TOTAL AREA(ACRES) =   43.60   PEAK FLOW RATE(CFS) =     99.90
  END OF SUBAREA STREETFLOW HYDRAULICS:
  DEPTH(FEET) =  .81   HALFSTREET FLOODWIDTH(FEET) = 20.00
  FLOW VELOCITY(FEET/SEC.) =  6.82   DEPTH*VELOCITY =   5.49


****************************************************************************
  FLOW PROCESS FROM NODE   139.11 TO NODE   139.11 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MINUTES) =  24.96
  RAINFALL INTENSITY (INCH./HOUR) =   2.49
  EFFECTIVE STREAM AREA(ACRES) =   43.60
  TOTAL STREAM AREA(ACRES) =   43.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     99.90

  CONFLUENCE INFORMATION:
  STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
  NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
----------------------------------------------------------------------
    1      302.25     22.77       2.629     .58      164.05
    2       99.90     24.96       2.488     .58       43.60

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.
  SUMMARY RESULTS:
  STREAM   CONFLUENCE   EFFECTIVE
  NUMBER     Q(CFS)    AREA(ACRES)
--------------------------------------------
    1      400.13       203.83
    2      381.35       207.65
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    400.13   TIME(MINUTES) =   22.769
  EFFECTIVE AREA(ACRES) =    203.83
  TOTAL AREA(ACRES) =    214.30


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

```
 FLOW PROCESS FROM NODE   139.11 TO NODE   139.12 IS CODE =   3
----------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
======================================================================
 DEPTH OF FLOW IN  66.0 INCH PIPE IS  52.8 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  19.6
 UPSTREAM NODE ELEVATION =  1312.00
 DOWNSTREAM NODE ELEVATION =  1287.00
 FLOWLENGTH(FEET) =  1600.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    400.13
 TRAVEL TIME(MIN.) =   1.36    TC(MIN.) =  24.13

**********************************************************************
 FLOW PROCESS FROM NODE   509.00 TO NODE   139.12 IS CODE =   8
----------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
======================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.539
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   21.00   SUBAREA RUNOFF(CFS) =   36.99
 EFFECTIVE AREA(ACRES) =  224.83
 AVERAGED Fm(INCH/HR) =   .582
 TOTAL AREA(ACRES) =  235.30
 PEAK FLOW RATE(CFS) =  400.13
 TC(MIN) =  24.13

**********************************************************************
 FLOW PROCESS FROM NODE   139.12 TO NODE   132.10 IS CODE =   3
----------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
======================================================================
 DEPTH OF FLOW IN  66.0 INCH PIPE IS  49.6 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  20.9
 UPSTREAM NODE ELEVATION =  1287.00
 DOWNSTREAM NODE ELEVATION =  1267.00
 FLOWLENGTH(FEET) =  1120.00   MANNINGS N =  .013
 ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    400.13
 TRAVEL TIME(MIN.) =    .89    TC(MIN.) =  25.02

**********************************************************************
 FLOW PROCESS FROM NODE   132.10 TO NODE   132.10 IS CODE =   1
----------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
======================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  25.02
```

```
 RAINFALL INTENSITY (INCH./HOUR) =   2.48
 EFFECTIVE STREAM AREA(ACRES) =  224.83
 TOTAL STREAM AREA(ACRES) =  235.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    400.13

 CONFLUENCE INFORMATION:
 STREAM    PEAK FLOW    TIME    INTENSITY     FM     EFFECTIVE
 NUMBER    RATE(CFS)   (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
-------------------------------------------------------------
   1       400.13      25.02        2.484      .58       224.83

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  1 STREAMS.
 SUMMARY RESULTS:
 STREAM    CONFLUENCE    EFFECTIVE
 NUMBER      Q(CFS)     AREA(ACRES)
---------------------------------------------
   1       400.13        224.83
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    400.13   TIME(MINUTES) =   25.021
 EFFECTIVE AREA(ACRES) =    224.83
 TOTAL AREA(ACRES) =    235.30
=============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =    235.30
 EFFECTIVE AREA(ACRES) =    224.83
 PEAK FLOW RATE(CFS)    =    400.13
=============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
        (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        Copyright 1983,86,87 Advanced Engineering Software (aes)
           Ver. 4.1C  Release Date: 5/11/87  Serial # I00908

                        Especially prepared for:

                             HALL & FOREMAN
 ************************** DESCRIPTION OF STUDY **********************
* N. FONTANA MASTER S.D. PLAN, W. FONTANA CHANNEL LAT. 8
* Q 100 YEAR + OVERFLOW FROM BASELINE AVE., SOUTH PORTION OF LINE T-8
* JN 3547
 **************************************************************************

  FILE NAME: WFONT8RB.100
  TIME/DATE OF STUDY:  2:48   1/ 1/1980
==========================================================================
  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 =
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =   .970
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.470
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) = 1.4700
  SLOPE OF INTENSITY DURATION CURVE =  .6000


**************************************************************************
  FLOW PROCESS FROM NODE   132.10 TO NODE   132.10 IS CODE =   7
--------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
==========================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  25.01   RAIN INTENSITY(INCH/HOUR) =  2.49
  EFFECTIVE AREA(ACRES) =   224.83
  TOTAL AREA(ACRES) =   235.30   PEAK FLOW RATE(CFS) =    400.13
  AVERAGED LOSS RATE, Fm(IN/HR) =   .580


**************************************************************************
  FLOW PROCESS FROM NODE   132.10 TO NODE   132.11 IS CODE =   4
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
==========================================================================
  PIPEFLOW VELOCITY(FEET/SEC.) =  16.8
  UPSTREAM NODE ELEVATION =  1267.00
```

```
 DOWNSTREAM NODE ELEVATION =  1260.00
 FLOWLENGTH(FEET) =  1000.00   MANNINGS N =  .013
 GIVEN PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    400.13
 TRAVEL TIME(MIN.) =    .99    TC(MIN.) =  26.00


****************************************************************************
 FLOW PROCESS FROM NODE   509.10 TO NODE   132.11 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.428
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
 SUBAREA AREA(ACRES) =   27.00   SUBAREA RUNOFF(CFS) =   44.86
 EFFECTIVE AREA(ACRES) =  251.83
 AVERAGED Fm(INCH/HR) =   .580
 TOTAL AREA(ACRES) =  262.30
 PEAK FLOW RATE(CFS) =  418.77
 TC(MIN) =  26.00


****************************************************************************
 FLOW PROCESS FROM NODE   132.11 TO NODE   600.01 IS CODE =   4
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
 PIPEFLOW VELOCITY(FEET/SEC.) =  16.1
 UPSTREAM NODE ELEVATION =  1260.00
 DOWNSTREAM NODE ELEVATION =  1258.00
 FLOWLENGTH(FEET) =   300.00   MANNINGS N =  .013
 GIVEN PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    418.77
 TRAVEL TIME(MIN.) =    .31    TC(MIN.) =  26.31


****************************************************************************
 FLOW PROCESS FROM NODE   600.01 TO NODE   600.02 IS CODE =   4
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
 DEPTH OF FLOW IN  69.0 INCH PIPE IS  51.6 INCHES
 PIPEFLOW VELOCITY(FEET/SEC.) =  20.1
 UPSTREAM NODE ELEVATION =  1258.00
 DOWNSTREAM NODE ELEVATION =  1240.00
 FLOWLENGTH(FEET) =  1150.00   MANNINGS N =  .013
 GIVEN PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
 PIPEFLOW THRU SUBAREA(CFS) =    418.77
 TRAVEL TIME(MIN.) =    .95    TC(MIN.) =  27.26


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

```
 FLOW PROCESS FROM NODE   600.02 TO NODE   600.02 IS CODE =   1
----------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MINUTES) =  27.26
 RAINFALL INTENSITY (INCH./HOUR) =   2.36
 EFFECTIVE STREAM AREA(ACRES) =  251.83
 TOTAL STREAM AREA(ACRES) =  262.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    418.77

****************************************************************
 FLOW PROCESS FROM NODE   600.50 TO NODE   600.51 IS CODE =   2
----------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
================================================================
 DEVELOPMENT IS  SINGLE FAMILY RESIDENTIAL -> 5-7 DWELLINGS/ACRE

 TC = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]** .20
 INITIAL SUBAREA FLOW-LENGTH =   900.00
 UPSTREAM ELEVATION =   1267.00
 DOWNSTREAM ELEVATION =   1252.00
 ELEVATION DIFFERENCE =     15.00
 TC =  .389*[(  900.00** 3.00)/(    15.00)]** .20 =   13.405
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.613
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 5-7 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .4
 SUBAREA RUNOFF(CFS) =     26.74
 TOTAL AREA(ACRES) =      9.50   PEAK FLOW RATE(CFS) =     26.74

****************************************************************
 FLOW PROCESS FROM NODE   600.51 TO NODE   600.61 IS CODE =   5
----------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL-CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================
 UPSTREAM NODE ELEVATION =   1252.00
 DOWNSTREAM NODE ELEVATION =   1242.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   550.00
 CHANNEL BASE(FEET) =   40.00   "Z" FACTOR =  99.990
 MANNINGS FACTOR =  .030   MAXIMUM DEPTH(FEET) =   1.00
 CHANNEL FLOW THRU SUBAREA(CFS) =     26.74
 FLOW VELOCITY(FEET/SEC) =   2.18   FLOW DEPTH(FEET) =    .20
 TRAVEL TIME(MIN.) =   4.20   TC(MIN.) =  17.60

****************************************************************
 FLOW PROCESS FROM NODE   600.60 TO NODE   600.61 IS CODE =   8
----------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.068
 SOIL CLASSIFICATION IS "A"
```

```
 RESIDENTIAL-> 5-7 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .4
 SUBAREA AREA(ACRES) =     9.50   SUBAREA RUNOFF(CFS) =    22.08
 EFFECTIVE AREA(ACRES) =   19.00
 AVERAGED Fm(INCH/HR) =    .485
 TOTAL AREA(ACRES) =    19.00
 PEAK FLOW RATE(CFS) =    44.17
 TC(MIN) =  17.60


****************************************************************************
 FLOW PROCESS FROM NODE    600.61 TO NODE    600.02 IS CODE =   6
----------------------------------------------------------------------------
 >>>>>COMPUTE STREETFLOW TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM ELEVATION =    1242.00    DOWNSTREAM ELEVATION =    1240.00
 STREET LENGTH(FEET) =    700.00    CURB HEIGTH(INCHES) = 6.
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK =  10.00
 INTERIOR STREET CROSSFALL(DECIMAL) =    .020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =    .040

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2

       **TRAVELTIME COMPUTED USING MEAN FLOW(CFS) =    44.17
 ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS:
       NOTE: STREETFLOW EXCEEDS TOP OF CURB.
       THE FOLLOWING STREETFLOW 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 FLOWDEPTH(FEET) =    .82
       HALFSTREET FLOODWIDTH(FEET) =   18.00
       AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.88
       PRODUCT OF DEPTH&VELOCITY =    2.37
 STREETFLOW TRAVELTIME(MIN) =    4.05   TC(MIN) =  21.65

  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.709
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 5-7 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .4
 SUBAREA AREA(ACRES) =      .00   SUBAREA RUNOFF(CFS) =     .00
 EFFECTIVE AREA(ACRES) =   19.00
 AVERAGED Fm(INCH/HR) =    .485
 TOTAL AREA(ACRES) =    19.00   PEAK FLOW RATE(CFS) =     44.17
 END OF SUBAREA STREETFLOW HYDRAULICS:
 DEPTH(FEET) =   .82   HALFSTREET FLOODWIDTH(FEET) = 18.00
 FLOW VELOCITY(FEET/SEC.) =  2.88   DEPTH*VELOCITY =   2.37


****************************************************************************
 FLOW PROCESS FROM NODE    600.30 TO NODE    600.02 IS CODE =   8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.709
```

```
 SOIL CLASSIFICATION IS "A"
 RESIDENTIAL-> 5-7 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .4
 SUBAREA AREA(ACRES) =   18.00   SUBAREA RUNOFF(CFS) =   36.04
 EFFECTIVE AREA(ACRES) =   37.00
 AVERAGED Fm(INCH/HR) =   .485
 TOTAL AREA(ACRES) =   37.00
 PEAK FLOW RATE(CFS) =   74.07
 TC(MIN) =  21.65

****************************************************************************
 FLOW PROCESS FROM NODE   600.02 TO NODE   600.02 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MINUTES) =  21.65
 RAINFALL INTENSITY (INCH./HOUR) =   2.71
 EFFECTIVE STREAM AREA(ACRES) =   37.00
 TOTAL STREAM AREA(ACRES) =   37.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     74.07

 CONFLUENCE INFORMATION:
 STREAM   PEAK FLOW   TIME   INTENSITY    FM    EFFECTIVE
 NUMBER   RATE(CFS)  (MIN.) (INCH/HOUR) (IN/HR) AREA(ACRES)
----------------------------------------------------------------
   1      418.77     27.26       2.360     .58      251.83
   2       74.07     21.65       2.709     .48       37.00

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  2 STREAMS.
 SUMMARY RESULTS:
 STREAM   CONFLUENCE   EFFECTIVE
 NUMBER     Q(CFS)    AREA(ACRES)
-----------------------------------------
   1      481.20       288.83
   2      472.06       237.03
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    481.20   TIME(MINUTES) =   27.263
 EFFECTIVE AREA(ACRES) =    288.83
 TOTAL AREA(ACRES) =    299.30

****************************************************************************
 FLOW PROCESS FROM NODE   600.02 TO NODE   600.03 IS CODE =   4
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
 PIPEFLOW VELOCITY(FEET/SEC.) =  18.5
 UPSTREAM NODE ELEVATION =  1240.00
 DOWNSTREAM NODE ELEVATION =  1215.00
 FLOWLENGTH(FEET) =  1500.00   MANNINGS N =  .013
 GIVEN PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
```

```
  PIPEFLOW THRU SUBAREA(CFS) =    481.20
  TRAVEL TIME(MIN.) =  1.35    TC(MIN.) =  28.61

****************************************************************************
  FLOW PROCESS FROM NODE   600.40 TO NODE   600.03 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.292
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   48.00   SUBAREA RUNOFF(CFS) =   73.89
  EFFECTIVE AREA(ACRES) =  336.83
  AVERAGED Fm(INCH/HR) =   .570
  TOTAL AREA(ACRES) =  347.30
  PEAK FLOW RATE(CFS) =  522.13
  TC(MIN) =  28.61

****************************************************************************
  FLOW PROCESS FROM NODE   600.03 TO NODE   600.04 IS CODE =   4
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPEFLOW TRAVELTIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE<<<<<
============================================================================
  PIPEFLOW VELOCITY(FEET/SEC.) =  20.1
  UPSTREAM NODE ELEVATION =  1215.00
  DOWNSTREAM NODE ELEVATION =  1191.00
  FLOWLENGTH(FEET) =  1750.00   MANNINGS N =  .013
  GIVEN PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
  PIPEFLOW THRU SUBAREA(CFS) =    522.13
  TRAVEL TIME(MIN.) =   1.45    TC(MIN.) =  30.06

****************************************************************************
  FLOW PROCESS FROM NODE   600.50 TO NODE   600.04 IS CODE =   8
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.225
  SOIL CLASSIFICATION IS "A"
  RESIDENTIAL-> 3-4 DWELLINGS/ACRE SUBAREA LOSS RATE, Fm(INCH/HR) =  .5
  SUBAREA AREA(ACRES) =   56.00   SUBAREA RUNOFF(CFS) =   82.82
  EFFECTIVE AREA(ACRES) =  392.83
  AVERAGED Fm(INCH/HR) =   .572
  TOTAL AREA(ACRES) =  403.30
  PEAK FLOW RATE(CFS) =  584.63
  TC(MIN) =  30.06

****************************************************************************
  FLOW PROCESS FROM NODE   600.04 TO NODE   600.04 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
================================================================================
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MINUTES) =  30.06
  RAINFALL INTENSITY (INCH./HOUR) =   2.23
  EFFECTIVE STREAM AREA(ACRES) =  392.83
  TOTAL STREAM AREA(ACRES) =  403.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    584.63
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =    403.30
  EFFECTIVE AREA(ACRES) =    392.83
  PEAK FLOW RATE(CFS)    =    584.63
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```