OTH2021-01347

PRELIMINARY HYDROLOGY ANALYSIS FOR A-TOWN TRACT 17703 LOT 1 – AREA B

City of Anaheim
County of Orange

DEPARTMENT OF PUBLIC WORKS
DEVELOPMENT SERVICES
APPROVED
Gabreelle Gonzalez, Assistant Engineer
5/24/2021, 9:45:32 AM
ANAH-OTH2021-01347
Gabreelle Gonzalez

PREPARED FOR:
LMC
A LENNAR COMPANY

PREPARED BY:
HUNSAKER & ASSOCIATES IRVINE, INC.
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IRVINE, CA 92618
(949) 583-1010

APRIL 30, 2021

W.O. #3916-62

PRELIMINARY HYDROLOGY ANALYSIS
FOR A-TOWN TRACT 17703
LOT 1 – AREA B

City of Anaheim
County of Orange

REGISTERED PROFESSIONAL ENGINEER
TU TRINH
No. 71555
CIVIL
STATE OF CALIFORNIA

PREPARED UNDER THE SUPERVISION OF:

4/30/2021

Tu Trinh, R.C.E. 71555 Date

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SECTION 1

A. PROJECT LOCATION

The project site is A-Town, Tract 17703, Lot 1 – Area B, in the City of Anaheim (City), County of Orange. The site is bounded by Katella Avenue on the north, Westside Drive on the west, Meridian Street on the south, and Market Street on the east (see attached Vicinity Map for more information).

B. STUDY PURPOSE

This study is to accompany the submittal of a Water Quality report. This study is preliminary, determines the 100-year, 25-year, 10-year, and 2-year peak storm runoff produced from the project site as approved by the City in 2016 for the overall Tract 17703 .

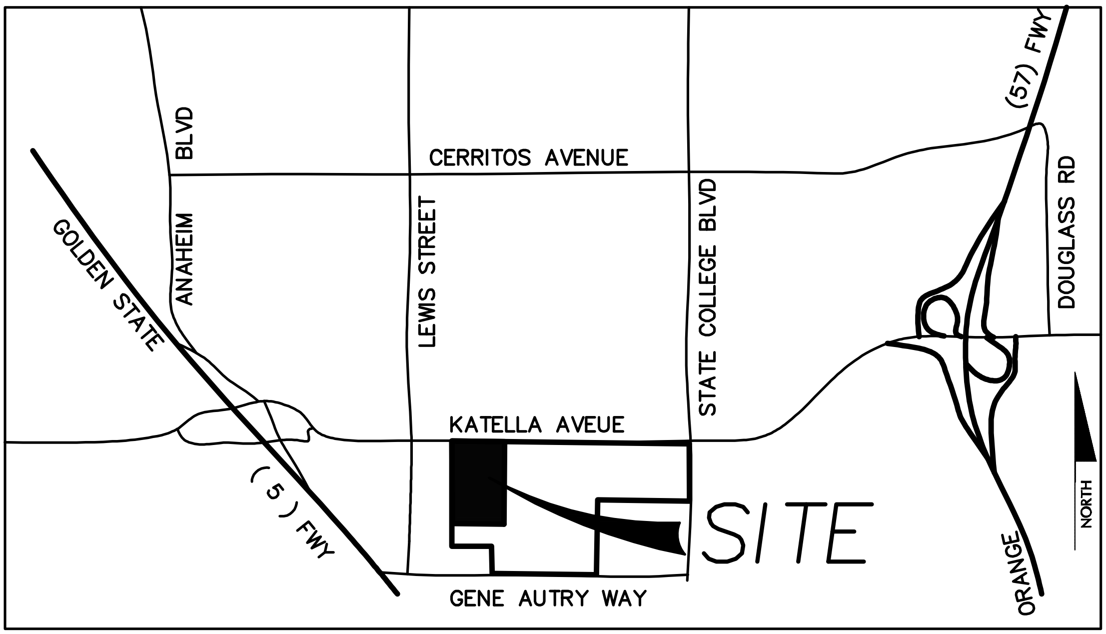
C. METHODOLOGY

The methodology used to determine the peak discharges for A-Town is based upon the criteria set forth in the *Orange County Flood Control District Hydrology Manual* dated 1986 as incorporated in the Advanced Engineering Software (AES) "RATSC" Program. The hydrologic soil types were determined from the Hydrologic Classification of Soils map contained in the *Orange County Hydrology Manual.*

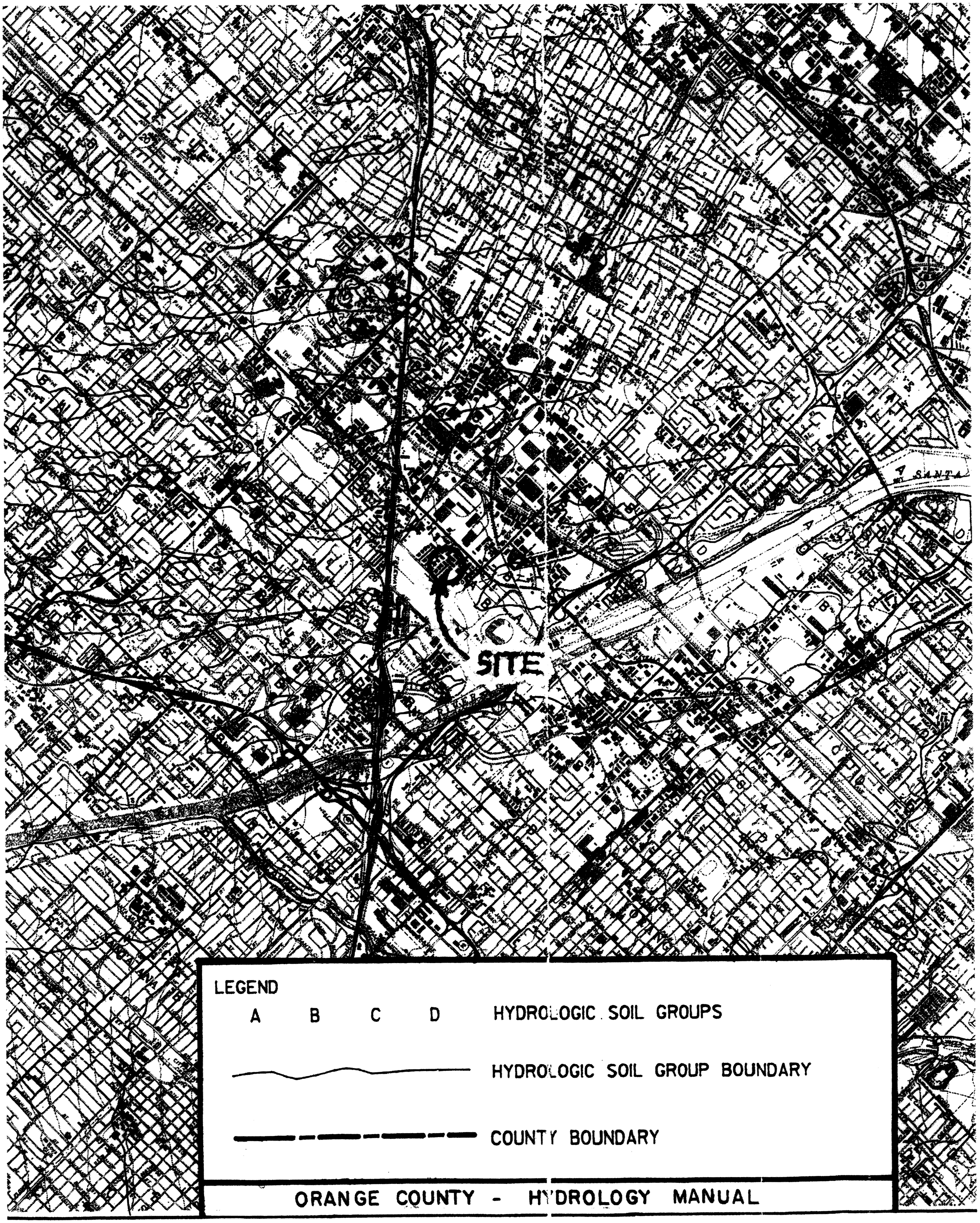
D. DISCUSSION

Per the current Site Plan, storm runoff produced from Lot 1 - Area B will drain in the same pattern and at the rate as shown on the proposed hydrology map of the approved drainage report dated April 27, 2016.

First flush flows produced from the site are collected in the proposed inlets throughout the site, then being diverted in the proposed diversion structures to drain to proposed Modular Wetland Systems. Treated flows are then stored in the proposed Storage Vaults. Water quality structures are shown on the hydrology map with dimensions and are addressed in details in a separate WQMP report.



VICINITY MAP


SITE
LEGEND
A B C D HYDROLOGIC SOIL GROUPS
HYDROLOGIC SOIL GROUP BOUNDARY
COUNTY BOUNDARY
ORANGE COUNTY - HYDROLOGY MANUAL

SECTION 2

HYDROLOGY CALCULATIONS

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____________________________________________________________________________
****************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
             (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
          (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                           Analysis prepared by:

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

 ************************* DESCRIPTION OF STUDY *************************
 * W.O. #3916-62, TRACT 17703, LOT 1, AREA 'B'                           *
 * 2-YR STUDY                                                            *
 * PROPOSED CONDITION                                                    *
 ************************************************************************

  FILE NAME: 17703B.DAT
  TIME/DATE OF STUDY: 21:08 02/22/2021
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                   --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) I ASSUMED FOR RATIONAL METHOD*

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

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

****************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    150.30  DOWNSTREAM(FEET) =    147.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.265
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.696
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        0.18      0.40     0.200    17    8.26
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      0.26
  TOTAL AREA(ACRES) =      0.18   PEAK FLOW RATE(CFS) =      0.26

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

```
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   147.80  DOWNSTREAM(FEET) =   147.00
  FLOW LENGTH(FEET) =   350.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   1.44
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.26
  PIPE TRAVEL TIME(MIN.) =   4.06    Tc(MIN.) =   12.32
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     650.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.32
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.349
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        0.20      0.40     0.200    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.23
  EFFECTIVE AREA(ACRES) =      0.38   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        0.4       PEAK FLOW RATE(CFS) =       0.43

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.32
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.349
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        1.30      0.40     0.200    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    1.30      SUBAREA RUNOFF(CFS) =    1.48
  EFFECTIVE AREA(ACRES) =      1.68   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        1.7       PEAK FLOW RATE(CFS) =       1.92

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.32
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.349
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.28      0.40     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.28      SUBAREA RUNOFF(CFS) =    0.33
  EFFECTIVE AREA(ACRES) =      1.96   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =        2.0       PEAK FLOW RATE(CFS) =       2.25
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****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    148.90  DOWNSTREAM(FEET) =    148.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.995
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.440
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        0.11      0.40     0.200    17   10.99
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      0.13
  TOTAL AREA(ACRES) =      0.11   PEAK FLOW RATE(CFS) =      0.13

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   148.30  DOWNSTREAM(FEET) =   147.60
  FLOW LENGTH(FEET) =   320.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   1.16
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.13
  PIPE TRAVEL TIME(MIN.) =   4.60    Tc(MIN.) =   15.59
  LONGEST FLOWPATH FROM NODE      4.00 TO NODE      6.00 =     620.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.59
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.178
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        0.16      0.40     0.200    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.16      SUBAREA RUNOFF(CFS) =    0.16
  EFFECTIVE AREA(ACRES) =      0.27   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        0.3       PEAK FLOW RATE(CFS) =       0.27

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.59
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.178
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        1.35      0.40     0.200    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
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 SUBAREA AREA(ACRES) =    1.35      SUBAREA RUNOFF(CFS) =    1.33
 EFFECTIVE AREA(ACRES) =      1.62   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        1.6       PEAK FLOW RATE(CFS) =       1.60

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.59
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.178
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A       0.08      0.40     0.100    17
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.08      SUBAREA RUNOFF(CFS) =    0.08
 EFFECTIVE AREA(ACRES) =      1.70   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        1.7       PEAK FLOW RATE(CFS) =       1.68
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        1.7  TC(MIN.) =     15.59
 EFFECTIVE AREA(ACRES) =      1.70  AREA-AVERAGED Fm(INCH/HR)=  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap = 0.195
 PEAK FLOW RATE(CFS)   =       1.68
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

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____________________________________________________________________________
****************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                           Analysis prepared by:

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

 ************************** DESCRIPTION OF STUDY **************************
 * W.O. #3916-62, TRACT 17703, LOT 1, AREA 'B'                              *
 * 10-YR STUDY                                                              *
 * PROPOSED CONDITION                                                       *
 **************************************************************************

  FILE NAME: 17703B.DAT
  TIME/DATE OF STUDY: 21:04 02/22/2021
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

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

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

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

****************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    150.30  DOWNSTREAM(FEET) =    147.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.265
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.044
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        0.18      0.40     0.200    32    8.26
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      0.48
  TOTAL AREA(ACRES) =      0.18   PEAK FLOW RATE(CFS) =      0.48

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

```
 FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   147.80  DOWNSTREAM(FEET) =   147.00
 FLOW LENGTH(FEET) =   350.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   1.72
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.48
 PIPE TRAVEL TIME(MIN.) =   3.39    Tc(MIN.) =   11.65
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     650.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.65
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.500
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       A        0.20      0.40     0.200    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.44
 EFFECTIVE AREA(ACRES) =      0.38   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        0.4       PEAK FLOW RATE(CFS) =       0.83

****************************************************************************
 FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.65
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.500
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       A        1.30      0.40     0.200    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    1.30      SUBAREA RUNOFF(CFS) =    2.83
 EFFECTIVE AREA(ACRES) =      1.68   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        1.7       PEAK FLOW RATE(CFS) =       3.66

****************************************************************************
 FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.65
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.500
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        0.28      0.40     0.100    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.28      SUBAREA RUNOFF(CFS) =    0.62
 EFFECTIVE AREA(ACRES) =      1.96   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.19
 TOTAL AREA(ACRES) =        2.0       PEAK FLOW RATE(CFS) =       4.28
```

```
****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    148.90  DOWNSTREAM(FEET) =    148.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.995
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.585
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        0.11      0.40     0.200    32   10.99
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      0.25
  TOTAL AREA(ACRES) =      0.11   PEAK FLOW RATE(CFS) =      0.25

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   148.30  DOWNSTREAM(FEET) =   147.60
  FLOW LENGTH(FEET) =   320.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   1.40
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.25
  PIPE TRAVEL TIME(MIN.) =   3.81    Tc(MIN.) =   14.80
  LONGEST FLOWPATH FROM NODE      4.00 TO NODE      6.00 =     620.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.80
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.180
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        0.16      0.40     0.200    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.16      SUBAREA RUNOFF(CFS) =    0.30
  EFFECTIVE AREA(ACRES) =      0.27   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        0.3       PEAK FLOW RATE(CFS) =       0.51

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.80
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.180
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        1.35      0.40     0.200    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
```

```
 SUBAREA AREA(ACRES) =    1.35      SUBAREA RUNOFF(CFS) =    2.55
 EFFECTIVE AREA(ACRES) =      1.62   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        1.6       PEAK FLOW RATE(CFS) =       3.06

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.80
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.180
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A       0.08      0.40     0.100    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.08      SUBAREA RUNOFF(CFS) =    0.15
 EFFECTIVE AREA(ACRES) =      1.70   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        1.7       PEAK FLOW RATE(CFS) =       3.22
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        1.7  TC(MIN.) =     14.80
 EFFECTIVE AREA(ACRES) =      1.70  AREA-AVERAGED Fm(INCH/HR)=  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap = 0.195
 PEAK FLOW RATE(CFS)   =       3.22
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

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

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 ************************** DESCRIPTION OF STUDY **************************
 * W.O. #3916-62, TRACT 17703, LOT 1, AREA 'B'                              *
 * 25-YR STUDY                                                              *
 * PROPOSED CONDITION                                                       *
 **************************************************************************

  FILE NAME: 17703B.DAT
  TIME/DATE OF STUDY: 21:02 02/22/2021
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                   --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

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

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

****************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    150.30  DOWNSTREAM(FEET) =    147.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.265
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.630
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        0.18      0.40     0.200    32    8.26
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      0.58
  TOTAL AREA(ACRES) =      0.18   PEAK FLOW RATE(CFS) =      0.58

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

```
 FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   147.80  DOWNSTREAM(FEET) =   147.00
 FLOW LENGTH(FEET) =   350.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   1.81
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.58
 PIPE TRAVEL TIME(MIN.) =   3.22    Tc(MIN.) =   11.48
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     650.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.48
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.013
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       A        0.20      0.40     0.200    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.53
 EFFECTIVE AREA(ACRES) =      0.38   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        0.4       PEAK FLOW RATE(CFS) =       1.00

****************************************************************************
 FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.48
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.013
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       A        1.30      0.40     0.200    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    1.30      SUBAREA RUNOFF(CFS) =    3.43
 EFFECTIVE AREA(ACRES) =      1.68   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        1.7       PEAK FLOW RATE(CFS) =       4.44

****************************************************************************
 FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.48
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.013
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        0.28      0.40     0.100    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.28      SUBAREA RUNOFF(CFS) =    0.75
 EFFECTIVE AREA(ACRES) =      1.96   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.19
 TOTAL AREA(ACRES) =        2.0       PEAK FLOW RATE(CFS) =       5.18
```

```
****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    148.90  DOWNSTREAM(FEET) =    148.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.995
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.088
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        0.11      0.40     0.200    32   10.99
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      0.30
  TOTAL AREA(ACRES) =      0.11   PEAK FLOW RATE(CFS) =      0.30

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   148.30  DOWNSTREAM(FEET) =   147.60
  FLOW LENGTH(FEET) =   320.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   1.48
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.30
  PIPE TRAVEL TIME(MIN.) =   3.61    Tc(MIN.) =   14.60
  LONGEST FLOWPATH FROM NODE      4.00 TO NODE      6.00 =     620.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.60
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.630
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        0.16      0.40     0.200    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.16      SUBAREA RUNOFF(CFS) =    0.37
  EFFECTIVE AREA(ACRES) =      0.27   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        0.3       PEAK FLOW RATE(CFS) =       0.62

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.60
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.630
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        1.35      0.40     0.200    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
```

```
 SUBAREA AREA(ACRES) =    1.35      SUBAREA RUNOFF(CFS) =    3.10
 EFFECTIVE AREA(ACRES) =      1.62   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        1.6       PEAK FLOW RATE(CFS) =       3.72

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.60
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.630
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        0.08      0.40     0.100    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.08      SUBAREA RUNOFF(CFS) =    0.19
 EFFECTIVE AREA(ACRES) =      1.70   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        1.7       PEAK FLOW RATE(CFS) =       3.90
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        1.7  TC(MIN.) =     14.60
 EFFECTIVE AREA(ACRES) =      1.70  AREA-AVERAGED Fm(INCH/HR)=  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap = 0.195
 PEAK FLOW RATE(CFS)   =       3.90
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

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

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

 ************************* DESCRIPTION OF STUDY **************************
* W.O. #3916-62, TRACT 17703, LOT 1, AREA 'B'                             *
* 100-YR STUDY                                                            *
* PROPOSED CONDITION                                                      *
 **************************************************************************

  FILE NAME: 17703B.DAT
  TIME/DATE OF STUDY: 21:00 02/22/2021
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

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

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

****************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    150.30  DOWNSTREAM(FEET) =    147.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.265
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.639
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        0.18      0.40     0.200    52    8.26
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      0.74
  TOTAL AREA(ACRES) =      0.18   PEAK FLOW RATE(CFS) =      0.74

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

```
 FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   147.80  DOWNSTREAM(FEET) =   147.00
 FLOW LENGTH(FEET) =   350.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   1.96
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.74
 PIPE TRAVEL TIME(MIN.) =   2.98    Tc(MIN.) =   11.24
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     650.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.24
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.890
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       A        0.20      0.40     0.200    52
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.69
 EFFECTIVE AREA(ACRES) =      0.38   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        0.4       PEAK FLOW RATE(CFS) =       1.30

****************************************************************************
 FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.24
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.890
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       A        1.30      0.40     0.200    52
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    1.30      SUBAREA RUNOFF(CFS) =    4.46
 EFFECTIVE AREA(ACRES) =      1.68   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        1.7       PEAK FLOW RATE(CFS) =       5.76

****************************************************************************
 FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.24
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.890
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        0.28      0.40     0.100    52
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.28      SUBAREA RUNOFF(CFS) =    0.97
 EFFECTIVE AREA(ACRES) =      1.96   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.19
 TOTAL AREA(ACRES) =        2.0       PEAK FLOW RATE(CFS) =       6.73
```

```
****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    148.90  DOWNSTREAM(FEET) =    148.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.995
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.939
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        0.11      0.40     0.200    52   10.99
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      0.38
  TOTAL AREA(ACRES) =      0.11   PEAK FLOW RATE(CFS) =      0.38

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   148.30  DOWNSTREAM(FEET) =   147.60
  FLOW LENGTH(FEET) =   320.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   1.59
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.38
  PIPE TRAVEL TIME(MIN.) =   3.35    Tc(MIN.) =   14.35
  LONGEST FLOWPATH FROM NODE      4.00 TO NODE      6.00 =     620.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.35
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.382
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        0.16      0.40     0.200    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    0.16      SUBAREA RUNOFF(CFS) =    0.48
  EFFECTIVE AREA(ACRES) =      0.27   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.20
  TOTAL AREA(ACRES) =        0.3       PEAK FLOW RATE(CFS) =       0.80

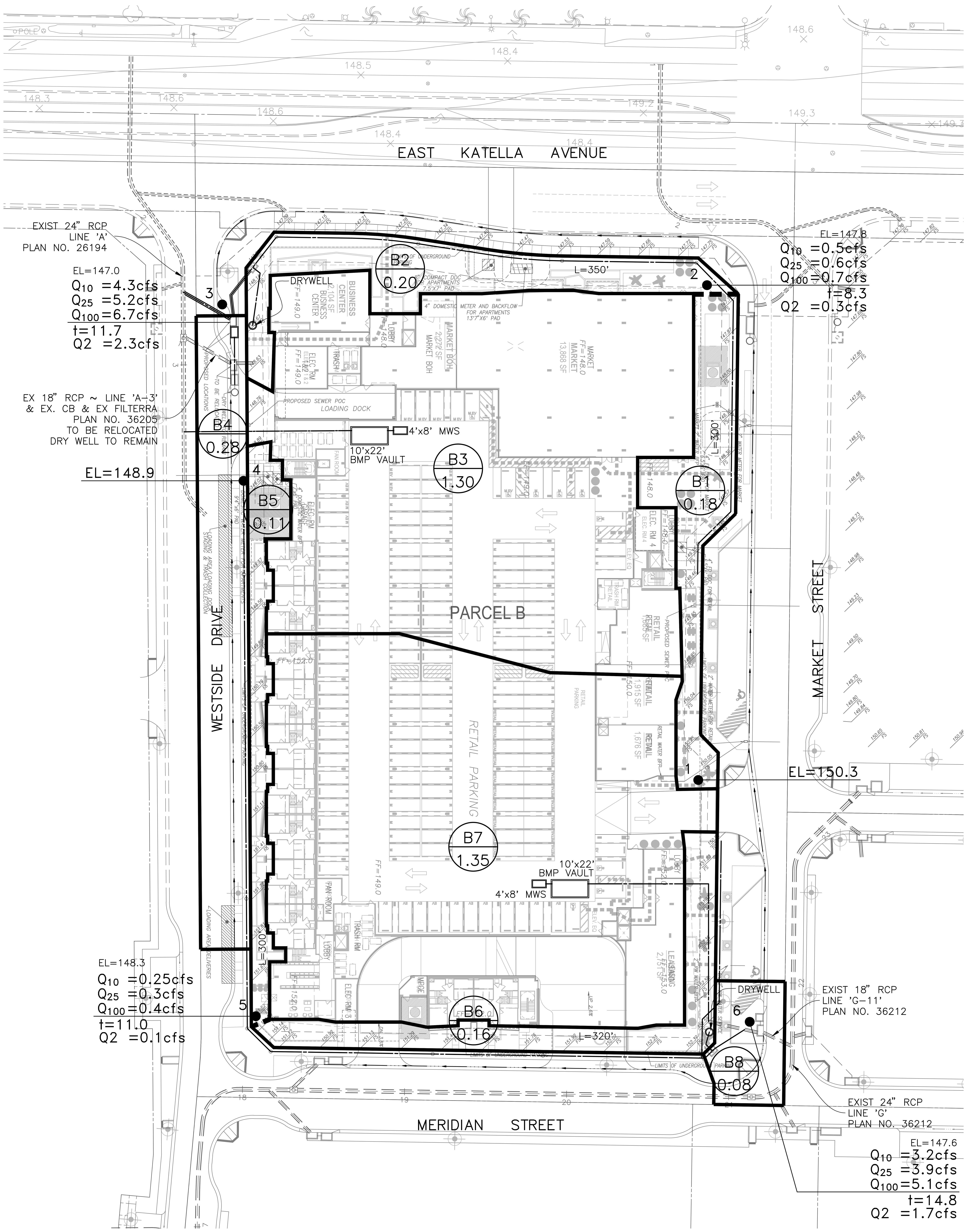
****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.35
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.382
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       A        1.35      0.40     0.200    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
```

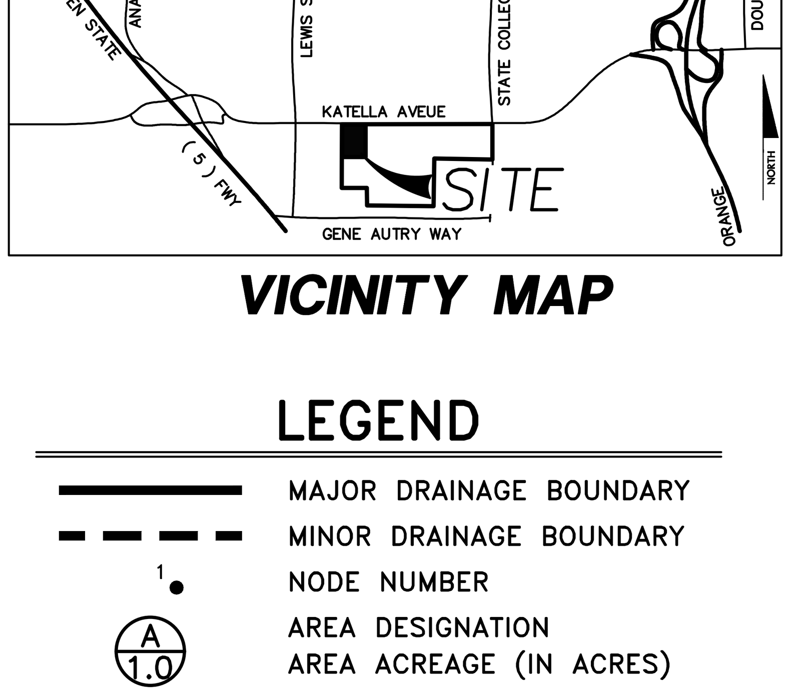
```
 SUBAREA AREA(ACRES) =    1.35      SUBAREA RUNOFF(CFS) =    4.01
 EFFECTIVE AREA(ACRES) =      1.62   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        1.6       PEAK FLOW RATE(CFS) =       4.81

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   14.35
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.382
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A       0.08      0.40     0.100    52
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    0.08      SUBAREA RUNOFF(CFS) =    0.24
 EFFECTIVE AREA(ACRES) =      1.70   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        1.7       PEAK FLOW RATE(CFS) =       5.06
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        1.7  TC(MIN.) =     14.35
 EFFECTIVE AREA(ACRES) =      1.70  AREA-AVERAGED Fm(INCH/HR)=  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap = 0.195
 PEAK FLOW RATE(CFS)   =       5.06
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

SECTION 3

HYDROLOGY MAP





VICINITY MAP

LEGEND

- MAJOR DRAINAGE BOUNDARY
- MINOR DRAINAGE BOUNDARY
- NODE NUMBER
- AREA DESIGNATION / AREA ACREAGE (IN ACRES)
- PEAK FLOW RATE / TIME OF CONCENTRATION
- PEAK CONFLUENCE FLOW RATE / TIME OF CONCENTRATION
- PROPOSED STORM DRAIN
- A — SOIL GROUP

GRAPHIC SCALE 1"=30'

SCALE: 1" = 30'

PREPARED FOR:

LMC
A Lennar Company

PREPARED BY:

HUNSAKER & ASSOCIATES
IRVINE, INC.
PLANNING ▪ ENGINEERING ▪ SURVEYING
Three Hughes ▪ Irvine, CA 92618 ▪ PH: (949) 583-1010 ▪ FX: (949) 583-0759

PRELIMINARY HYDROLOGY MAP FOR A-TOWN TRACT NO. 17703 LOT 1 - AREA B

W.O. #3916-62X

PLOTTED BY: Tu Trinh DATE: Mar. 12, 2021 12:37:15 PM FILE: F:\0108\Engineering\SY_HYDROLOGY\Tr 17703 Area B\Hydro Map for 17703 Area B.dwg

SECTION 4

REFERENCES

APPROVED

SD IMPROVEMENT PLANS

FOR A-TOWN TRACT 17703

CITY OF ANAHEIM
STORM DRAIN IMPROVEMENT PLANS
FOR
TRACT 17703

GENERAL NOTES

1. ALL WORK WITHIN THE RIGHT-OF WAY WILL REQUIRE A RIGHT-OF-WAY EXCAVATION & CONSTRUCTION PERMIT.
2. CONTACT THE FIELD ENGINEER AT (714) 765-5126 48 HOURS PRIOR TO ANY OF THIS WORK.
3. ALL WORK SHALL BE IN ACCORDANCE WITH THE APPLICABLE SECTIONS OF STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION, CITY OF ANAHEIM STANDARD PLANS, CONTRACT DOCUMENTS AND STANDARD SPECIFICATION SUPPLEMENT AND THE LATEST REVISIONS THEREOF."
4. THE CONTRACTOR SHALL NOTIFY UNDERGROUND SERVICE ALERT AT 1-800-422-4133 A MINIMUM OF 48 HOURS PRIOR TO START OF CONSTRUCTION WITHIN THE RIGHT-OF-WAY.
5. ALL PAVING REMOVAL SHALL BE SAWCUT AT THE FIELD ENGINEER'S DIRECTION. MINIMUM DEPTH OF CUT: 0.12'.
6. PAVING SHALL BE SAWCUT AND REMOVED A MINIMUM OF 1' FROM CURB AND GUTTER CONSTRUCTION OR RECONSTRUCTION.
7. THE PROTECTION AND ADJUSTMENT OF ALL UTILITIES SHALL BE THE RESPONSIBILITY OF THE DEVELOPER.
8. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO PROTECT AND/OR RELOCATE ALL TRAFFIC SIGNS AND TRAFFIC SIGNALS AS SHOWN ON THE PLANS OR AS REQUIRED BY THE FIELD ENGINEER.
9. IRRIGATION LINES SHALL BE REMOVED, RELOCATED OUT OF THE STREET RIGHT-OF-WAY, ENCASED IN A STEEL SLEEVE, OR REPLACED WITH CAST IRON AS DIRECTED BY THE PARKS DIVISION. NOTIFY THE PARKS DIVISION AT (714) 765-5155 48 HOURS PRIOR TO WORK.
10. REPORTS OF COMPACTION WITHIN THE RIGHT-OF-WAY SHALL BE SUBMITTED TO AND ACCEPTED BY THE FIELD ENGINEER PRIOR TO PLACING ANY PAVING.
11. IN THE EVENT THAT EXISTING STRIPING IS OBLITERATED BY CONSTRUCTION, IT WILL BE THE RESPONSIBILITY OF THE DEVELOPER TO REPLACE SAID STRIPING.
12. PRIOR TO CONSTRUCTION, ALL SURVEY POINTS THAT MAY BE DISTURBED SHALL BE TIED OUT AND A CORNER RECORD OF EACH POINT SHALL BE FILED WITH THE COUNTY SUPERVISOR. A COPY OF THE RECORDED CORNER RECORD SHALL BE SUBMITTED TO THE CITY'S FIELD SERVICES DIVISION. FOLLOWING THE COMPLETION OF THE CONSTRUCTION, A CORNER RECORD OF EACH POINT THAT WAS DISTURBED SHALL BE FILED WITH THE COUNTY SURVEYOR. A COPY OF THE RECORDED CORNER RECORD SHALL BE SUBMITTED TO THE CITY'S FIELD SERVICES DIVISION PRIOR TO THE RECORDING OF A CERTIFICATE OF COMPLETION OR RELEASE OF BONDS.

GENERAL NOTES FOR STORM DRAIN AND SEWER IMPROVEMENT PLANS

1. PRIOR TO DELIVERY OF STORM DRAIN PIPES, CONTACT FIELD ENGINEERING AT (714) 765-5126 FOR D-LOAD TEST APPROVAL.
2. THE CONTRACTOR SHALL CHECK THE FLOW LINE ELEVATION OF EXISTING JUNCTURE AGAINST CONTROL PROVIDED PRIOR TO CONSTRUCTION. IF THE EXISTING FLOW LINE VARIES FROM THE PLAN ELEVATION BY MORE THAN ±0.10' THE ENGINEER SHALL ADJUST THE GRADES BETWEEN THE JUNCTURE AND THE NEXT UPSTREAM MANHOLE, WITH THE APPROVAL OF THE FIELD ENGINEER.
3. ADJUST ALL MANHOLES TO GRADE AFTER PLACING FINAL LIFT OF ASPHALT.
4. 2-SACK SAND CEMENT SLURRY TRENCH BACKFILL SHALL BE REQUIRED TO 1' ABOVE THE FINISH TOP OF PIPE WHERE LINE IS CONSTRUCTED AT A SLOPE OF 5:1 OR MORE.
5. CERTIFICATION BY A LICENSED SURVEYOR OR REGISTERED CIVIL ENGINEER SHALL BE SUBMITTED PRIOR TO FINAL ACCEPTANCE CERTIFYING THAT THE STORM DRAIN SYSTEM WAS INSTALLED ON GRADE PER APPROVED PLAN.

BASIS OF BEARINGS:

BEARINGS SHOWN HEREON ARE BASED UPON THE BEARINGS BETWEEN O.C.S. HORIZONTAL CONTROL STATION GPS NO. 3094 AND STATION GPS NO. 3086 BEING NORTH 89°07'46" WEST PER RECORDS ON FILE IN THE OFFICE OF THE ORANGE COUNTY SURVEYOR.

LEGAL DESCRIPTION:

IN THE CITY OF ANAHEIM, COUNTY OF ORANGE, STATE OF CALIFORNIA, BEING A SUBDIVISION OF LOTS 2 THROUGH 10, INCLUSIVE, LOTS 12 THROUGH 14, INCLUSIVE, LOTS A, B, MARKET STREET, BRYANT STREET, GRANVILLE DRIVE, TRIAD STREET, UNION STREET, MERIDIAN LANE, METRO DRIVE, PARK LANE, KATELLA AVENUE, GENE AUTRY WAY, STATE COLLEGE BOULEVARD AND WESTSIDE DRIVE OF TRACT NO. 16859 AS SHOWN ON A MAP RECORDED IN BOOK 892, PAGES 1 THROUGH 10, INCLUSIVE, OF MISCELLANEOUS MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY.

NOTICE TO CONTRACTOR PRIOR TO CONSTRUCTION

BEFORE PROCEEDING WITH THIS WORK, THE CONTRACTOR SHALL CAREFULLY CHECK AND VERIFY ALL CONDITIONS, QUANTITIES, DIMENSIONS AND SURFACE GRADE ELEVATIONS, UTILITY CONNECTION ELEVATIONS AND LOCATIONS AND SHALL REPORT ALL DISCREPANCIES TO THE ENGINEER PRIOR TO THE COMMENCEMENT OF WORK.

UNAUTHORIZED CHANGES & USES: THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR, OR LIABLE FOR, UNAUTHORIZED CHANGES TO, DELETIONS FORM OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE PRESENTED IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS AND THE ENGINEER OF RECORD IN WRITING.

CONTRACTOR SHALL IMPLEMENT AND MAINTAIN EROSION CONTROL MEASURES IN ACCORDANCE WITH EROSION CONTROL PLAN GRA.

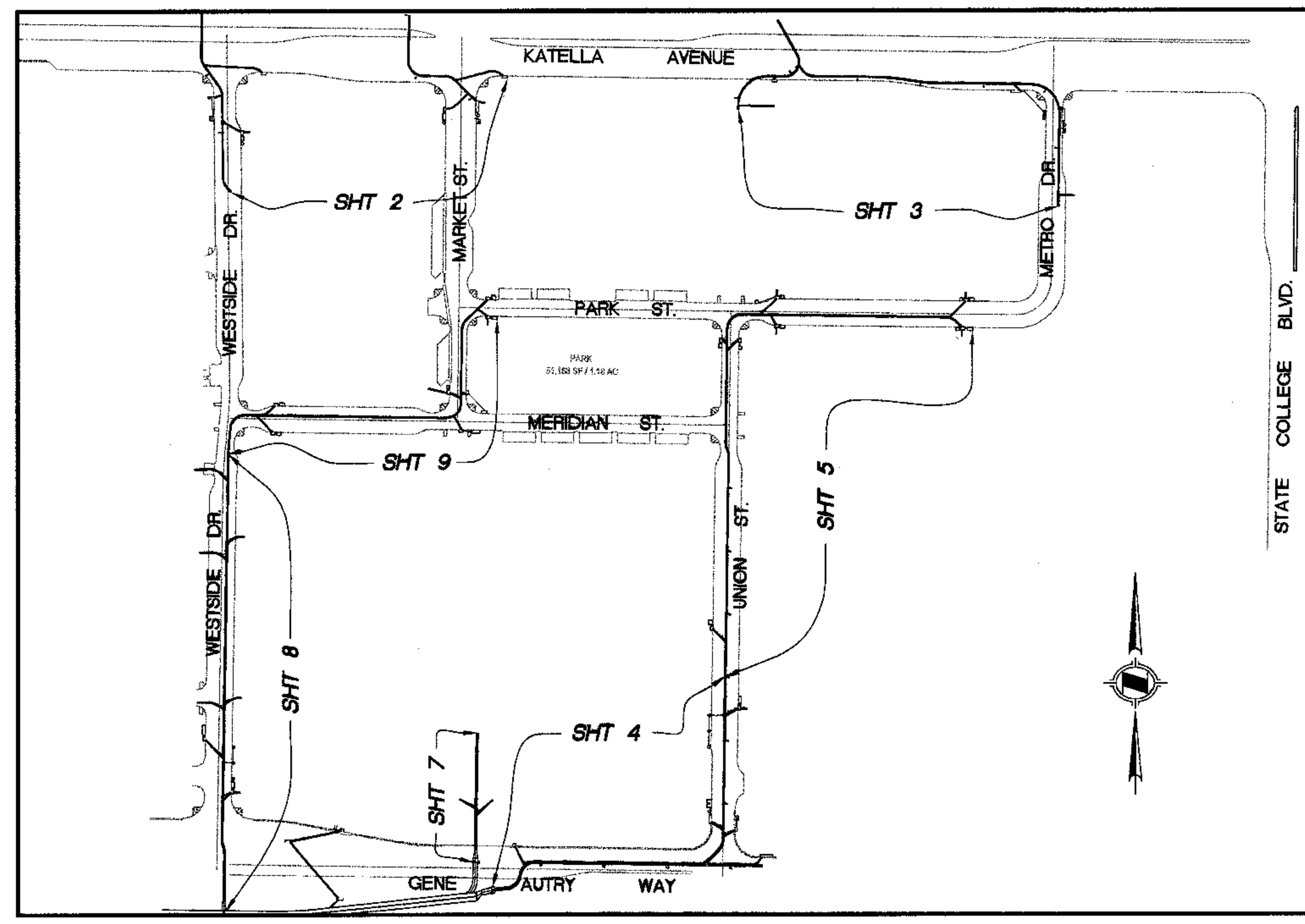
UNDERGROUND SERVICE ALERT

Call:Toll FREE
1-800-422-4133
TWO WORKING DAYS BEFORE YOU DIG

"CAUTION": Remember that the USA Center notifies only those utilities belonging to the center. There could be other utilities present at the work site. The center will inform you of whom they will notify.

WATER NOTES
(SEWER/STORM DRAIN IMPROVEMENT)

1. ALL EXISTING PUBLIC WATER FACILITIES SHALL BE PROTECTED IN PLACE. THE CONTRACTOR PERFORMING THIS WORK SHALL BE RESPONSIBLE FOR ALL COSTS AS A RESULT OF ANY DAMAGE OR REPAIRS TO EXISTING WATER FACILITIES.
2. IN CASE OF AN EMERGENCY, THE CONTRACTOR SHALL IMMEDIATELY CONTACT WATER FIELD/OPERATIONS AT (714)765-4560 AND WATER ENGINEERING (714)765-5196.
3. SMALL WATER SERVICE LATERALS (I.E. 2" AND SMALLER) ARE TYPICALLY NOT SHOWN ON PLANS, BUT MUST BE PROTECTED IN PLACE. THE NORMAL DEPTH OF COVER FOR WATER SERVICE LATERALS IS 30".
4. UNLESS OTHERWISE APPROVED, THE FOLLOWING CLEARANCES SHALL BE MAINTAINED BETWEEN EXISTING WATER FACILITIES AND ANY OTHER PROPOSED IMPROVEMENTS:
   A. A MINIMUM SEPARATION OF 12 INCHES FOR VERTICAL CROSSINGS.
   B. A MINIMUM SEPARATION OF 5 FEET FOR HORIZONTAL/PARALLEL INSTALLATIONS, EXCEPT FOR SANITARY SEWERS WHICH REQUIRE A MINIMUM HORIZONTAL SEPARATION OF 10-FEET.
   C. A MINIMUM OF 2-FEET AROUND ANY ABOVE-GROUND WATER FACILITY/APPURTENANCE.
5. ALL UNUSED WATER FACILITIES SHALL BE ABANDONED AT THE MAIN AS DIRECTED BY THE ENGINEER. PRIOR TO ABANDONMENT OF SERVICES 4" AND LARGER, THE CONTRACTOR SHALL ENSURE SERVICE LINE IS RESTRAINED TO THE MAINS.
6. ADJUST EXISTING WATER VALVE BOX TO GRADE PER WATER STD. W-152.
7. PROVIDE LATERAL SUPPORT EXISTING WATER MAIN DURING SEWER CONSTRUCTION. INSTALL ADEQUATE SHORING AND BRACING FOR THE FULL DEPTH OF SEWER TRENCH EXCAVATION.
8. CONTRACTOR SHALL CONTACT CITY OF ANAHEIM WATER INSPECTION (714)765-4591 PRIOR TO BEGINNING WORK. ALL EXCAVATION AROUND EXISTING PUBLIC WATER FACILITIES SHALL BE OBSERVED BY CITY WATER INSPECTOR.

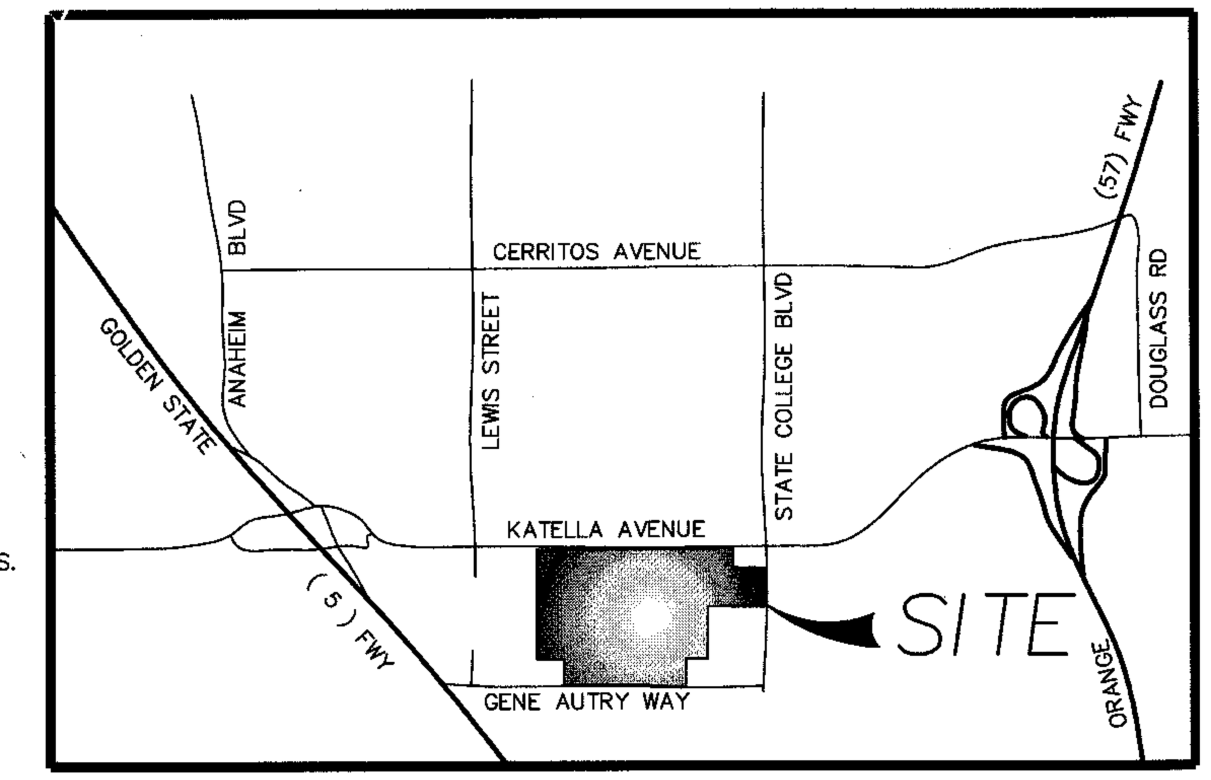


INDEX MAP
SCALE: 1" = 200'

ABBREVIATIONS

FS	FINISH SURFACE
TC	TOP OF CURB
FL	FLOW LINE
CL	CENTER LINE
BC	BEGIN CURVE
EC	END CURVE
W	WATER
S	SEWER
CB	CATCH BASIN
LF	LINEAR FEET
HCL	HYDRAULIC GRADE LINE
EA	EACH
MH	MANHOLE
JS	JUNCTION STRUCTURE
RCP	REINFORCED CONCRETE PIPE
PRC	POINT OF REVERSE CURVE

INDEX OF SHEETS:



VICINITY MAP

CONSTRUCTION NOTES & QUANTITY ESTIMATE

NO.	DESCRIPTION	AMOUNT	UNIT
47	CONST MODIFIED J.S. PER SPPWC STD PLAN NO 333-2, DETAIL ON SHEET 8	1	EA.
48	INST. 1'H x 6'W R.C.B.	8	L.F.
49	REMOVE PLUG AND JOIN EXISTING	4	EA.
50	TRANS. FROM 1'H x 6'W RCB TO 30" RCP PER SPPWC STD. PLAN NO. 342-2	17.5	L.F.
51	CONST. CONCRETE COLLAR PER SPPWC STD. PLAN NO. 380-4	6	EA.
52	CONST. J.S. PER SPPWC STD. PLAN NO. 331-3	15	EA.
53	INST. 18" RCP (SEE PROFILE FOR D-LOAD) BEDDING PER OCPW STD. NO. 1319, DETAIL ON SHEET 13	552	L.F.
55	INST. 30" RCP (SEE PROFILE FOR D-LOAD) BEDDING PER OCPW STD. NO. 1319, DETAIL ON SHEET 13	551	L.F.
56	CONST THE MAXWELL IV AUXILIARY PER TORRENT RESOURCES, DETAIL ON SHT. 12	3	EA.
57	INST. 22.5° ELBOW	3	EA.
58	CONST. C.B. PER CITY OF ANAHEIM STD. DETAIL NO. 300-2, CASE A WITH AUTOMATIC RETRACTABLE SCREEN & CONNECTOR PIPE SCREEN ★★	18	EA.
59	CONST. DOUBLE BRICK AND MORTAR PLUG	5	EA.
60	INST. 24" RCP (SEE PROFILE FOR D-LOAD) BEDDING PER OCPW STD. NO. 1319, DETAIL ON SHEET 13	1323	L.F.
61	CONST. M.H. PER SPPWC STD. PLAN NO. 321-2	6	EA.
62	CONST. BLANKET PROTECTION PER SPPWC STD. PLAN NO. 225-2 WITH 2 SACK CEMENT SAND SLURRY (NO CONCRETE)	36	L.F.
63	INST. 4" SCH-80 PVC OUTLET PIPE	150	L.F.
64	CONST. THE MAXWELL IV PER TORRENT RESOURCES, DETAIL ON SHEET 13	9	EA.
65	CONST. 4'x10' FILTERRA BOX WITH 4" SCH-80 PVC OUTLET PIPE	2	EA.
66	CONST. 4'x12' FILTERRA BOX WITH 4" SCH-80 PVC OUTLET PIPE	2	EA.
67	CONST. 4'x16' FILTERRA BOX WITH 6" SCH-80 PVC OUTLET PIPE	1	EA.
68	CONST. MODIFIED MH PER SPPWC STD PLAN NO 321-2, DETAIL ON SHEET 12	1	EA.
69	CONST. MODIFIED MH PER SPPWC STD PLAN NO 321-2, DETAIL ON SHEET 12	1	EA.
70	CONST. 4'x4' FILTERRA BOX WITH 4" SCH-80 PVC OUTLET PIPE	4	EA.
71	CONST. 4'x6' FILTERRA BOX WITH 4" SCH-80 PVC OUTLET PIPE	7	EA.
72	CONST. 4'x8' FILTERRA BOX WITH 4" SCH-80 PVC OUTLET PIPE	4	EA.
76	CONST. 6'x6' FILTERRA BOX WITH 6" SCH-80 PVC OUTLET PIPE	2	EA.
77	CONST. AUTOMATIC RETRACTABLE SCREEN AND CONNECTOR PIPE SCREEN ON EX. CATCH BASIN ★★	5	EA.
80	INST. 6" SCH-80 PVC OUTLET PIPE	-	L.F.

★★ INSTALL AUTOMATIC RETRACTABLE SCREEN AND CONNECTOR PIPE SCREEN. RETRACTABLE SCREEN AND CONNECTOR PIPE SCREEN SHALL BE CONSTRUCTED OF CORROSION RESISTANT MATERIALS AND SHALL BE "FULL CAPTURE" DESIGN AND OF MAINTAINABLE DESIGN. CONTRACTOR SHALL MAKE PRODUCT SUBMITTAL TO ENGINEER FOR APPROVAL PRIOR TO CONSTRUCTION.

NOTE:
- SUPPORT FOR CONDUITS ACROSS TRENCHES PER SPPWC STD. PLAN NO. 224-2
- TRENCH REPLACEMENT PER CITY OF ANAHEIM STD. DETAIL NO. 132-C

I HEREBY CERTIFY THAT THE IMPROVEMENTS HAVE BEEN COMPLETED IN CONFORMANCE WITH THIS APPROVAL PLAN.

EDWARD A. MANDICH
RCE 59089
EXP.: 06/30/17
DATE

HUNSAKER & ASSOCIATES
3 HUGHES, IRVINE CA 92018
(949) 583-1010

SERVICE AGENCIES :

CITY OF ANAHEIM, ENGINEERING DIV.	(714) 765-5176
CITY OF ANAHEIM, ELECTRICAL DEPT.	(714) 765-5156
CITY OF ANAHEIM, FIELD ENGR.	(714) 765-5126
CITY OF ANAHEIM, WATER ENGR. DIV.	(714) 765-5196
PACIFIC TELEPHONE	(714) 633-0811
SO. CALIFORNIA GAS COMPANY	(714) 634-3258

ENGINEER:
H&A
HUNSAKER & ASSOCIATES
IRVINE, INC.
PLANNING • ENGINEERING • SURVEYING
Three Hughes • Irvine, CA 92618
FX: (949) 583-0759 • PH: (949) 583-1010
Ed Mandich 5-6-16
EDWARD A. MANDICH, RCE NO. 59089 DATE

REGISTERED PROFESSIONAL ENGINEER
EDWARD A. MANDICH
No. 59089
CIVIL
STATE OF CALIFORNIA

RCP 2015-11013

OWNER:
PT METRO, LLC
25 ENTERPRISE, 3rd FLOOR
ALISO VIEJO, CA 92656
(949) 349-8000

SOILS ENGINEER:
GROUP DELTA CONSULTANTS
32 MAUCHLY, SUITE B
IRVINE, CA 92618
PH: (949) 450-2100

THESE PLANS HAVE BEEN EXAMINED AND IS APPROVED ONLY AS TO COMPATIBILITY WITH ADJOINING EXISTING OR FUTURE IMPROVEMENTS AND CONFORMANCE WITH CITY OF ANAHEIM STANDARD DETAILS AND THE REQUIREMENTS FOR THE FOLLOWING APPLICABLE FACTORS: RIGHT-OF-WAY, ROADWAY MATERIALS, ALIGNMENTS AND GRADES, HYDROLOGY AND HYDRAULIC DESIGN OF STORMDRAIN OR SANITARY SEWER SYSTEMS AND UNDER GROUND CONDUIT OR OPEN CHANNEL CHANNEL ALIGMENTS, GRADES, SIZES AND MATERIALS.

ENGINEER'S NOTE TO CONTRACTOR : THE EXISTENCE LOCATION OF ANY UNDERGROUND UTILITIES, PIPES, AND/OR STRUCTURES SHOWN ON THESE PLANS WERE OBTAINED BY A SEARCH OF AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE, THERE ARE NO EXISTING UTILITIES EXCEPT AS SHOWN ON THESE PLANS. THE CONTRACTOR SHALL AS CERTAIN THE TRUE VERTICAL AND HORIZONTAL LOCATION AND SIZE OF THOSE TO BE USED OF ANY UNDERGROUND UTILITIES AND SHALL BE RESPONSIBLE FOR DAMAGE TO ANY PUBLIC OR PRIVATE UTILITIES AS SHOWN HEREON.

REVISIONS

NO.	INIT.	DATE	DESCRIPTION	DATE	APP'D
△	T.T.	11/7/16	REVISED LINES 'G-2' & 'G-3' ON SHEETS 8 & 10, PLAN NO'S 36211 & 36213	12/1/16	[illegible]

REFERENCES

BENCH MARK: 9A-22 ELEVATION: 151.99 (NAVD88)
KATELLA AVENUE/STATE COLLEGE BLVD.
BRASS CAP MKD C OF A BM, IN THE TOP OF CURB AT THE SE ECR.
ELEVATION: 151.99 (NAVD88)

PLANS FOR THESE IMPROVEMENTS: STREET:
SEWER: 36168-36170 WATER: W-3175
STORM DRAIN: 36204-36216
LANDSCAPE:

APPROVAL

ELECTRICAL ENGINEERING DIVISION
DATE 5-24-16

WATER ENGINEERING DIVISION
DATE 5/23/16

RECOMMEND APPROVAL
DEVELOPMENT SERVICES MANAGER
DATE 5/25/16

PLANNING DIVISION
DATE

CITY ENGINEER
DATE 5/26/16

STORM DRAIN PLANS
TRACT 17703

CITY OF ANAHEIM

SHEET 1 OF 13

PLAN NO.
36204

FOR CITY USE ONLY W.O. 3916-14 STORM DRAIN IMPROVEMENT PLANS ROOM: BIN: DOC: 74026

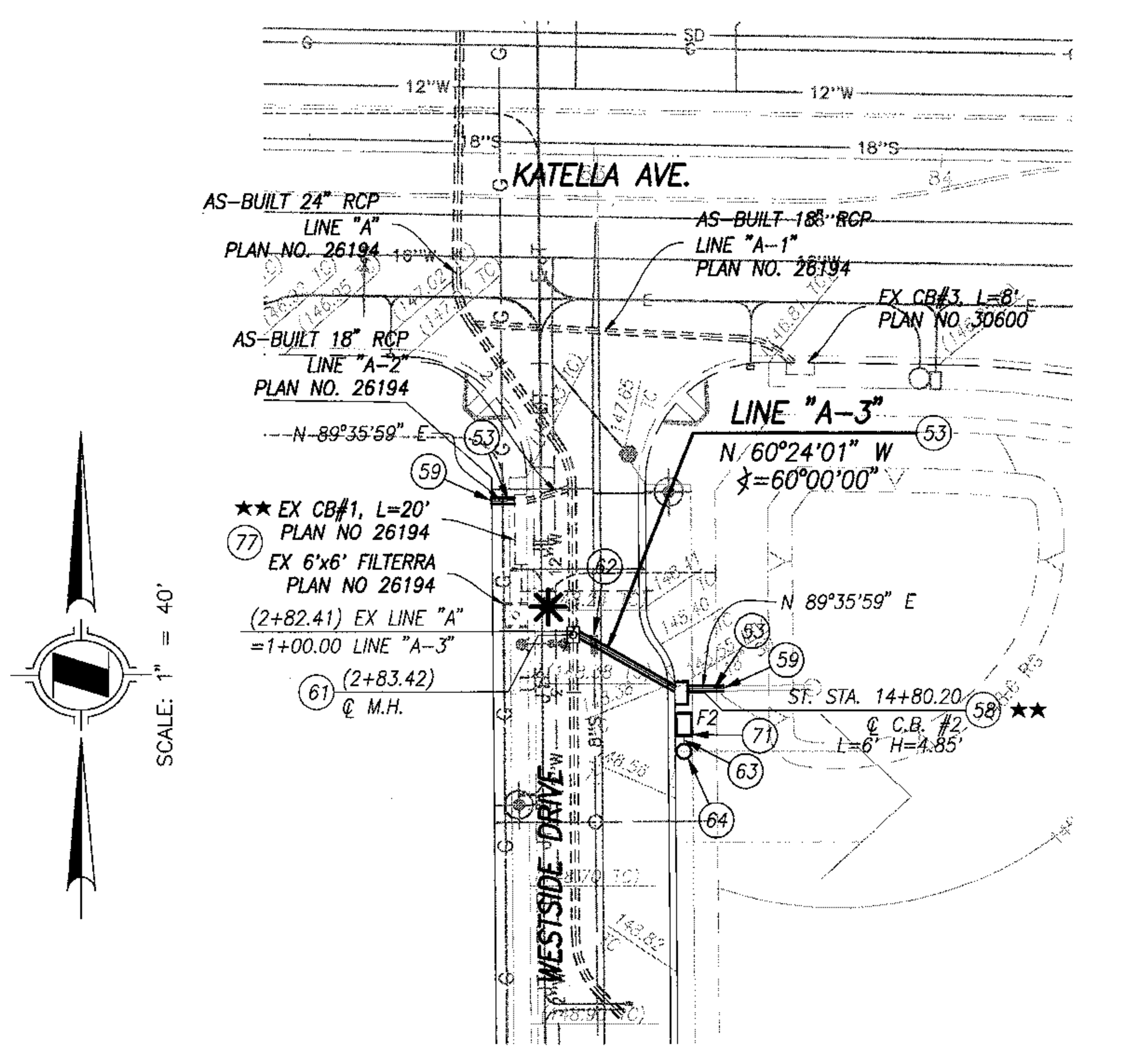
D-108

36204

PLOTTED BY: Tiffany Nguyen DATE: Apr. 27, 2016 02:45:47 PM FILE: F:\0108\Engineering\TR_17703\Imp_Storm Drain\SHT-01.dwg

* CONTRACTOR SHALL VERIFY LOCATION AND ELEVATION PRIOR TO START OF ANY CONSTRUCTION.

PROFILE SCALES
HORIZ.: 1"= 40'
VERT.: 1"= 4'



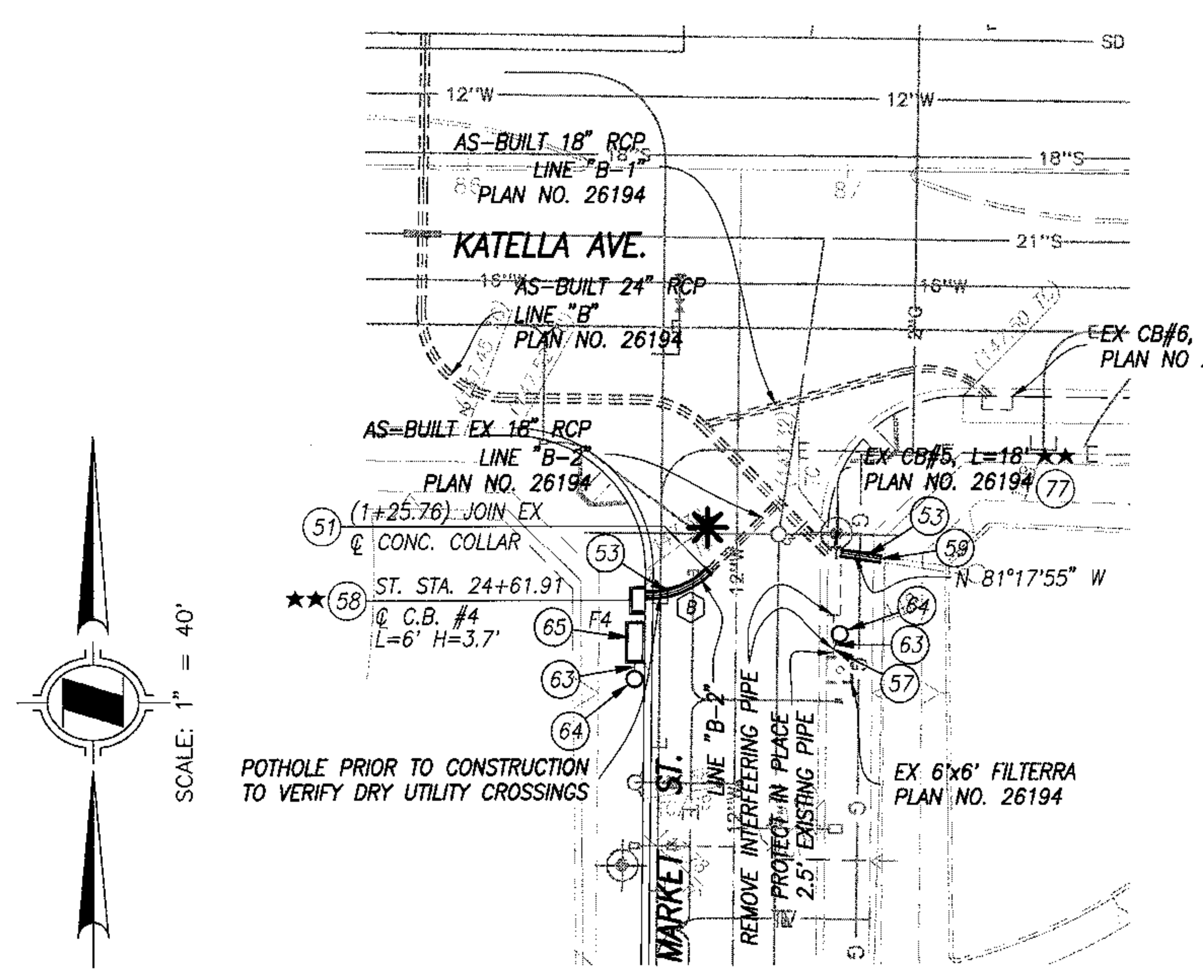
AS-BUILT LINE "A"
PLAN NO. 26194

HYDRAULIC DATA

LINE	STA to STA	Q_{10}	DIA	So	n	Dc	Vc	Sc	Dn	Vn	Vf	Sf
"A"	1+41.00 1+49.00	13.6	24"	0.3250	0.013	1.39	6.37	0.0063	0.46	27.32	4.71	0.0043
"A"	1+49.00 1+86.23	13.6	24"	0.0020	0.013	1.39	6.37	0.0063	FULL	---	4.71	0.0043
"A"	1+86.23 2+41.54	12.1	24"	0.0020	0.013	1.31	6.07	0.0059	FULL	---	4.20	0.0034
"A"	2+41.54 2+82.98	5.7	24"	0.0020	0.013	0.84	4.53	0.0046	1.07	3.32	1.81	0.0006
"A"	2+82.98 3+97.03	0.0	24"	0.0020	0.013	0.00	0.00	0.0000	0.00	0.00	0.00	0.0000
"A-1"	1+03.28 1+94.10	1.8	18"	0.0020	0.013	0.47	3.33	0.0049	0.60	2.41	0.91	0.0002
"A-2"	1+02.34 1+13.51	6.6	18"	0.0070	0.013	1.07	5.65	0.0072	1.08	5.60	4.30	0.0052
"A-3"	1+02.85 1+33.49	5.7	18"	0.0020	0.013	0.92	5.01	0.0061	FULL	---	3.23	0.0029
"B"	1+41.00 1+49.00	8.9	24"	0.2190	0.013	1.06	5.23	0.0050	0.39	20.50	2.83	0.0015
"B"	1+49.00 2+63.14	8.9	24"	0.0022	0.013	1.06	5.23	0.0050	1.40	3.78	2.83	0.0015
"B"	2+63.14 2+91.21	6.9	24"	0.0022	0.013	0.93	4.81	0.0048	1.18	3.60	2.20	0.0009
"B"	2+91.21 3+09.83	5.3	24"	0.0022	0.013	0.80	4.40	0.0046	0.99	3.36	1.66	0.0005
"B-1"	1+02.85 1+79.27	2.1	18"	0.0053	0.013	0.53	3.55	0.0049	0.52	3.64	1.13	0.0004
"B-2"	1+02.20 1+44.14	1.7	18"	0.0060	0.013	0.49	3.39	0.0049	0.47	3.64	0.96	0.0003

CURVE DATA

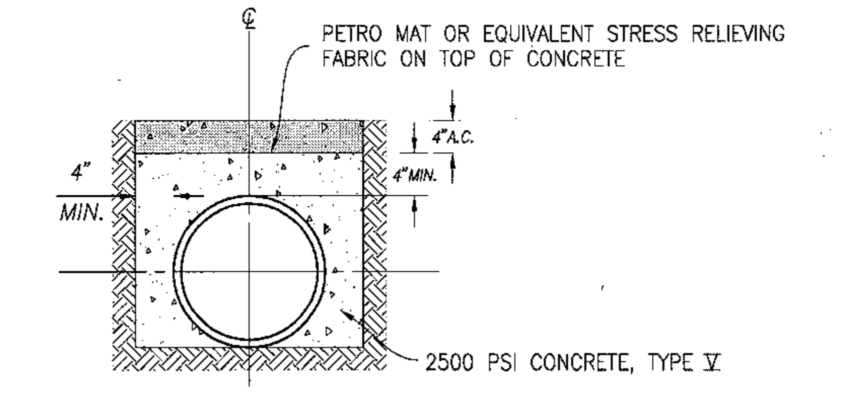
	BEARING/DELTA	RADIUS	LENGTH	TANGENT
A	43°13'43"	22.50'	16.98'	8.91'
B	46°48'22"	22.50'	18.38'	9.74'



AS-BUILT LINE "B"
PLAN NO 26194

CONSTRUCTION NOTES

- (51) CONST. CONC. COLLAR PER SPPWC STD. PLAN NO. 380-4
- (53) INST. 18" R.C.P. (SEE PROFILE FOR D-LOAD) BEDDING PER OCPW STD. NO. 1319, DETAIL ON SHEET 13
- (57) INST. 22.5° ELBOW
- (58) CONST. C.B. PER CITY OF ANAHEIM STD. DETAIL NO. 300-2, CASE A WITH AUTOMATIC RETRACTABLE SCREEN AND CONNECTOR PIPE SCREEN ★★
- (59) CONST. DOUBLE BRICK AND MORTAR PLUG
- (61) CONST. M.H. PER SPPWC STD. PLAN NO. 321-2
- (62) CONST. BLANKET PROTECTION PER SPPWC STD. PLAN NO. 225-2 WITH 2 SACK CEMENT SAND SLURRY (NO CONCRETE)
- (63) INST. 4" SCH-80 PVC OUTLET PIPE
- (64) CONST. THE MAXWELL IV PER TORRENT RESOURCES, DETAIL ON SHT. 13
- (65) CONST. 4'x10' FILTERRA BOX WITH 4" SCH-80 PVC OUTLET PIPE
- (71) CONST. 4'x6' FILTERRA BOX WITH 4" SCH-80 PVC OUTLET PIPE
- (77) CONSTRUCT AUTOMATIC RETRACTABLE SREEN AND CONNECTOR PIPE SCREEN ON EX. CATCH BASIN ★★



SLURRY BACKFILL DETAIL
N.T.S.

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REVISIONS

NO.	INIT.	DATE	DESCRIPTION	DATE	APP'D

REFERENCES

BENCH MARK: 9A-22 ELEVATION: 151.99 (NAVD88)
KATELLA AVENUE/STATE COLLEGE BLVD.
BRASS CAP MKD C OF A BM, IN THE TOP OF CURB AT THE SE ECR.
ELEVATION: 151.99 (NAVD88)

PLANS FOR THESE IMPROVEMENTS: STREET:
SEWER: 36168-36170 WATER: W-3175
STORM DRAIN: 36204-36216
LANDSCAPE:

APPROVAL

FOR APPROVAL, SEE PLAN NO. 36204

ENGINEER:
HUNSAKER & ASSOCIATES
IRVINE, INC.
PLANNING ▪ ENGINEERING ▪ SURVEYING
Three Hughes ▪ Irvine, CA 92618
FX: (949) 583-0759 ▪ PH: (949) 583-1010
EDWARD A. MANDICH, RCE NO. 59089 5-6-16 DATE

REGISTERED PROFESSIONAL ENGINEER EDWARD A. MANDICH No. 59089 CIVIL STATE OF CALIFORNIA

RCP 2015-11013

OWNER:
PT METRO, LLC
25 ENTERPRISE, 3rd FLOOR
ALISO VIEJO, CA 92656
(949) 349-8000

SOILS ENGINEER:
GROUP DELTA CONSULTANTS
32 MAUCHLY, SUITE B
IRVINE, CA 92618
PH: (949) 450-2100

STORM DRAIN PLANS
TRACT 17703
AS-BUILT LINES 'A-1' & 'B-2' EXTENSION
LINE 'A-3'

CITY OF ANAHEIM

SHEET 2 OF 13

PLAN NO. 36205

FOR CITY USE ONLY W.O. 3916-14 STORM DRAIN IMPROVEMENT PLANS ROOM: BIN: DOC: 74026

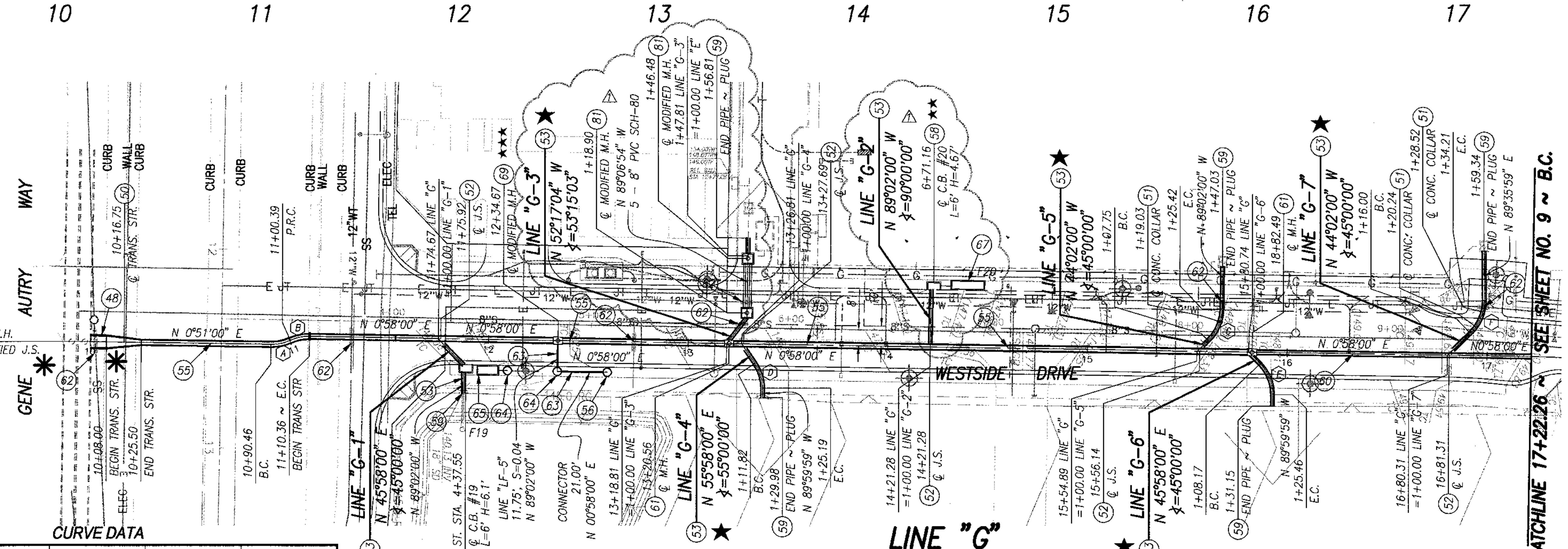
D-108

36205

PLOTTED BY: Tiffany Nguyen DATE: Apr. 27, 2016 02:46:03 PM FILE: F:\0108\Engineering\TR_17703\Imp_Storm Drain\SHT-02.dwg

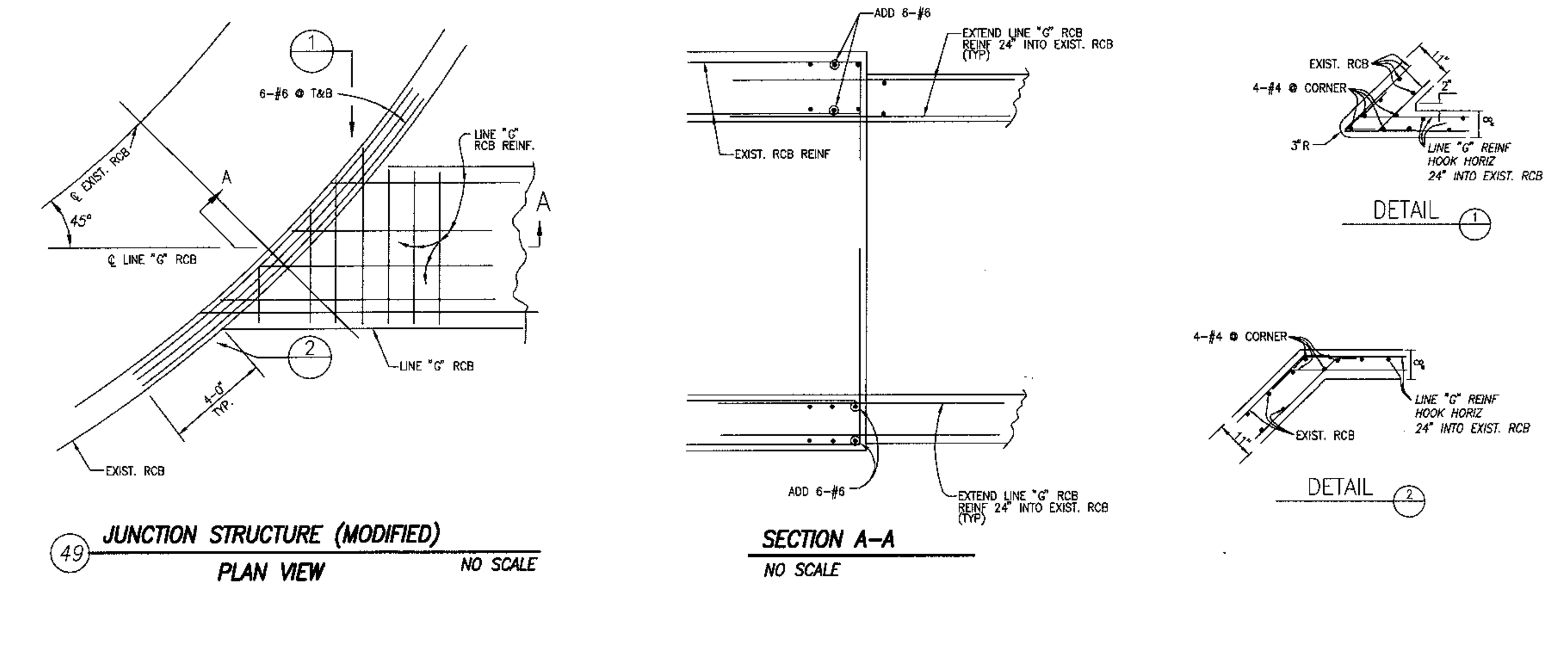
* CONTRACTOR SHALL VERIFY LOCATION AND ELEVATION PRIOR TO START OF ANY CONSTRUCTION.

PROFILE SCALES	
HORIZ.:	1" = 40'
VERT.:	1" = 4'



CURVE DATA

	BEARING/DELTA	RADIUS	LENGTH	TANGENT
A	25°16'47"	22.50'	9.93'	5.05'
B	~~25°23'46"~~	~~22.50'~~	~~9.97'~~	~~5.07'~~
D	~~34°02'00"~~	~~22.50'~~	~~13.36'~~	~~6.89'~~
E	44°02'00"	22.50'	17.29'	9.10'
F	46°22'00"	22.50'	18.21'	9.64'
G	45°00'00"	22.50'	17.67'	9.32'



CONSTRUCTION NOTES

- (47) CONST. MODIFIED J.S. PER SPPWC STD. PLAN NO. 333-2 & DETAIL HEREON
- (48) INST. 1'H x 6'W RCB
- (50) CONST. TRANS. FROM 1'H x 6'W RCB TO 30" RCP PER SPPWC STD. PLAN NO. 342-2
- (51) CONST CONC COLLAR PER SPPWC STD PLAN NO 380-4
- (52) CONST. J.S. PER SPPWC STD. PLAN NO. 331-3
- (53) INST. 18" R.C.P. (SEE PROFILE FOR D-LOAD) BEDDING PER OCPW STD. NO. 1319, DETAIL ON SHEET 13
- (55) INST. 30" R.C.P. (SEE PROFILE FOR D-LOAD) BEDDING PER OCPW STD. NO. 1319, DETAIL ON SHEET 13
- (56) CONST. THE MAXWELL IV AUXILIARY PER TORRENT RESOURCES, DETAIL ON SHEET 12
- (58) CONST. C.B. PER CITY OF ANAHEIM STD. DETAIL NO. 300-2, CASE A WITH AUTOMATIC RETRACTABLE SCREEN AND CONNECTOR PIPE SCREEN ★★
- (59) CONST. DOUBLE BRICK AND MORTAR PLUG
- (60) INST. 24" R.C.P. (SEE PROFILE FOR D-LOAD) BEDDING PER OCPW STD. NO. 1319, DETAIL ON SHEET 13
- (61) CONST. M.H. PER SPPWC STD. PLAN NO. 321-2
- (62) CONST. BLANKET PROTECTION PER SPPWC STD. PLAN NO. 225-2 WITH 2 SACK CEMENT SAND SLURRY (NO CONCRETE)
- (63) INST. 4" SCH-80 PVC OUTLET PIPE
- (64) CONST. THE MAXWELL IV PER TORRENT RESOURCES, DETAIL ON SHT. 13
- (65) CONST. 4'x10' FILTERRA BOX WITH 4" SCH-80 PVC OUTLET PIPE
- (67) CONST. 4'x16' FILTERRA BOX WITH 6" SCH-80 PVC OUTLET PIPE
- ★★★ (69) CONST. MODIFIED M.H. PER SPPWC STD. PLAN NO. 321-2 DETAIL ON SHEET 12
- (81) CONST. MODIFIED M.H., 5' WIDE, PER CITY OF ANAHEIM STD. PLAN NO. 321-1
- ★ PROFILE ON SHEET NO. 10

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★★★ NOTE: TEMPORARY BLOCK 4" OUTLET TO DRY WELLS UNTIL ALL THE UPSTREAM PARCELS ARE STABLIZED OR COMPLETED

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RCP 2015-11013

ENGINEER: HUNSAKER & ASSOCIATES IRVINE, INC.
PLANNING ▪ ENGINEERING ▪ SURVEYING
Three Hughes ▪ Irvine, CA 92618
FX: (949) 583-0759 ▪ PH: (949) 583-1010

EDWARD A. MANDICH, RCE NO. 59089 — 11-10-16 DATE

REGISTERED PROFESSIONAL ENGINEER EDWARD A. MANDICH No. 59089 CIVIL STATE OF CALIFORNIA

OWNER: PT METRO, LLC
25 ENTERPRISE, 3rd FLOOR
ALISO VIEJO, CA 92656
(949) 349-8000

SOILS ENGINEER: GROUP DELTA CONSULTANTS
32 MAUCHLY, SUITE B
IRVINE, CA 92618
PH: (949) 450-2100

REVISIONS

NO.	INIT.	DATE	DESCRIPTION	DATE	APP'D
1	T.T.	11/7/16	RELOCATED CB#20 OF LINE "G-2" TO ST STA 6+71.16. REPLACED 18" RCP WITH 5 - 8" PVC SCH-80 BETWEEN TWO MODIFIED MH OF LINE "G-3"		

REFERENCES

BENCH MARK: 9A-22 ELEVATION: 151.99 (NAVD88)
KATELLA AVENUE/STATE COLLEGE BLVD.
BRASS CAP MKD C OF A BM, IN THE TOP OF CURB AT THE SE ECR.
ELEVATION: 151.99 (NAVD88)

PLANS FOR THESE IMPROVEMENTS:
SEWER: 36168-36170 — STREET:
STORM DRAIN: 36204-36216 — WATER: W-3175
LANDSCAPE:

APPROVAL

FOR APPROVAL, SEE PLAN NO. 36204

STORM DRAIN PLANS
TRACT 17703

LINES "G", "G-1" & "G-2"

CITY OF ANAHEIM

SHEET 8 OF 13

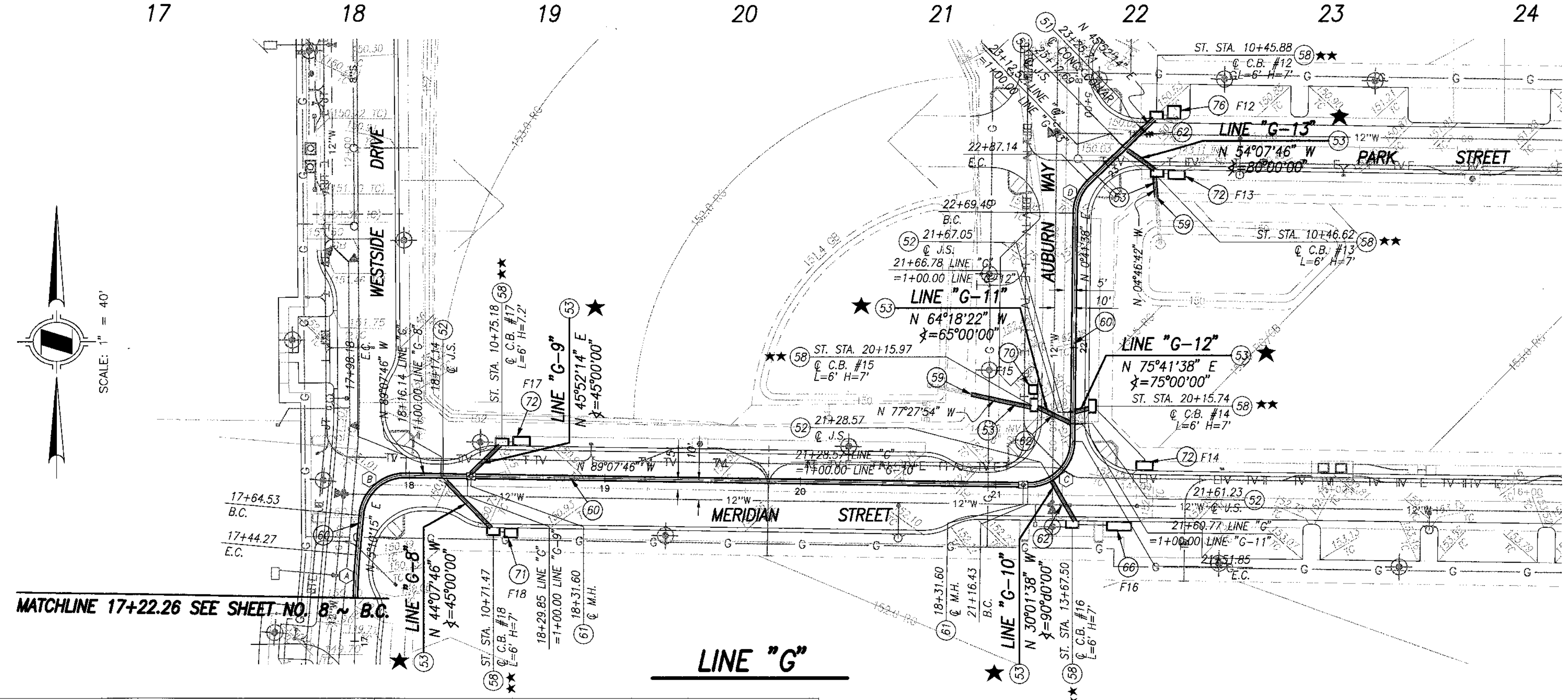
PLAN NO. 36211

FOR CITY USE ONLY W.O. 3916.14 STORM DRAIN IMPROVEMENT PLANS ROOM: BIN: DOC: 7402C

D-108

36211

PLOTTED BY: Tu Trinh DATE: Nov. 09, 2016 09:38:55 AM FILE: F:\0108\Engineering\TR_17703\Imp_Storm Drain\SHT-08.dwg



CONSTRUCTION NOTES

- (51) CONST CONC COLLAR PER SPPWC STD PLAN NO 380-4
- (52) CONST. J.S. PER SPPWC STD. PLAN NO. 331-3
- (53) INST. 18" R.C.P. (SEE PROFILE FOR D-LOAD) BEDDING PER OCPW STD. NO 1319, DETAIL ON SHEET 13
- (58) CONST. C.B. PER CITY OF ANAHEIM STD. DETAIL NO. 300-2, CASE A WITH AUTOMATIC RETRACTABLE SCREEN AND CONNECTOR PIPE SCREEN ★★
- (60) INST. 24" R.C.P. (SEE PROFILE FOR D-LOAD) BEDDING PER OCPW STD. NO. 1319, DETAIL ON SHEET 13
- (61) CONST. M.H. PER SPPWC STD. PLAN NO. 321-2
- (62) CONST. BLANKET PROTECTION PER SPPWC STD. PLAN NO. 225-2 WITH 2 SACK CEMENT SAND SLURRY (NO CONCRETE)
- (66) CONST. 4'x12' FILTERRA BOX WITH 4" SCH-80 PVC OUTLET PIPE
- (70) CONST. 4'x4' FILTERRA BOX WITH 4" SCH-80 PVC OUTLET PIPE
- (71) CONST. 4'x6' FILTERRA BOX WITH 4" SCH-80 PVC OUTLET PIPE
- (72) CONST. 4'x8' FILTERRA BOX WITH 4" SCH-80 PVC OUTLET PIPE
- (76) CONST. 6'x6' FILTERRA BOX WITH 6" SCH-80 PVC OUTLET PIPE
- ★ PROFILE ON SHEET NO. 10

CURVE DATA

	BEARING/DELTA	RADIUS	LENGTH	TANGENT
A	04°12'15"	300.00'	22.01'	11.01'
B	85°41'59"	22.50'	33.65'	20.87'
C	90°10'36"	22.50'	35.41'	22.57'
D	45°10'36"	22.50'	17.74'	9.36'

HYDRAULIC DATA

LINE	STA to STA	Q_{10}	DIA	So	n	Dc	Vc	Sc	Dn	Vn	Vf	Sf
"G"	17+22.26 18+17.14	7.9	24"	0.0020	0.013	1.00	5.03	0.0049	1.16	4.18	2.51	0.0012
"G"	18+17.14 18+29.27	7.6	24"	0.0020	0.013	0.98	4.97	0.0048	1.13	4.14	2.42	0.0011
"G"	18+33.93 21+11.77	7.0	24"	0.0020	0.013	0.94	4.83	0.0048	1.22	3.48	2.23	0.0010
"G"	21+16.43 21+28.57	7.0	24"	0.0020	0.013	0.94	4.83	0.0048	1.22	3.48	2.23	0.0010
"G"	21+28.57 21+61.23	6.3	24"	0.0020	0.013	0.89	4.67	0.0047	1.14	3.40	2.01	0.0008
"G"	21+61.23 21+67.05	3.5	24"	0.0020	0.013	0.65	3.91	0.0045	0.81	2.93	1.11	0.0002
"G"	21+67.05 23+12.69	3.2	24"	0.0020	0.013	0.62	3.82	0.0045	0.77	2.86	1.02	0.0002
"G"	23+12.69 23+25.71	0.7	24"	0.0020	0.013	0.29	2.52	0.0049	0.36	1.85	0.22	0.0000
"G"	23+25.71 23+33.71	0.7	24"	0.2040	0.013	0.29	2.52	0.0049	0.12	9.29	0.22	0.0000
"G8"	1+03.71 1+36.77	0.5	18"	0.0650	0.013	0.26	2.42	0.0052	0.14	5.91	0.28	0.0000
"G9"	1+02.47 1+22.63	0.9	18"	0.0720	0.013	0.35	2.83	0.0050	0.18	7.27	0.51	0.0001

★★ INSTALL AUTOMATIC RETRACTABLE SCREEN AND CONNECTOR PIPE SCREEN, RETRACTABLE SCREEN AND CONNECTOR PIPE SCREEN SHALL BE CONSTRUCTED OF CORROSION RESISTANT MATERIALS AND SHALL BE "FULL CAPTURE" DESIGN AND OF MAINTAINABLE DESIGN. CONTRACTOR SHALL MAKE PRODUCT SUBMITTAL TO ENGINEER FOR APPROVAL PRIOR TO CONSTRUCTION.

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ENGINEER'S NOTE TO CONTRACTOR : THE EXISTENCE LOCATION OF ANY UNDERGROUND UTILITIES, PIPES, AND/OR STRUCTURES SHOWN ON THESE PLANS WERE OBTAINED BY A SEARCH OF AVAILABLE RECORDS. TO THE BEST OF OUR KNOWLEDGE, THERE ARE NO EXISTING UTILITIES EXCEPT AS SHOWN ON THESE PLANS. THE CONTRACTOR SHALL AS CERTAIN THE TRUE VERTICAL AND HORIZONTAL LOCATION AND SIZE OF THOSE TO BE USED OF ANY UNDERGROUND UTILITIES AND SHALL BE RESPONSIBLE FOR DAMAGE TO ANY PUBLIC OR PRIVATE UTILITIES AS SHOWN HEREON.

RCP 2015-11013

ENGINEER: HUNSAKER & ASSOCIATES IRVINE, INC.
PLANNING ▪ ENGINEERING ▪ SURVEYING
Three Hughes, Irvine, CA 92618
FX: (949) 583-0759 PH: (949) 583-1010
EDWARD A. MANDICH, RCE NO. 59089 — DATE 5-6-16
REGISTERED PROFESSIONAL ENGINEER, EDWARD A. MANDICH, No. 59089, CIVIL, STATE OF CALIFORNIA

OWNER: PT METRO, LLC
25 ENTERPRISE, 3rd FLOOR
ALISO VIEJO, CA 92656
(949) 349-8000

SOILS ENGINEER: GROUP DELTA CONSULTANTS
32 MAUCHLY, SUITE B
IRVINE, CA 92618
PH: (949) 450-2100

REVISIONS

NO.	INIT.	DATE	DESCRIPTION	DATE	APP'D

REFERENCES

BENCH MARK: 9A-22 ELEVATION: 151.99 (NAVD88)
KATELLA AVENUE/STATE COLLEGE BLVD.
BRASS CAP MKD C OF A BM. IN THE TOP OF CURB AT THE SE ECR.
ELEVATION: 151.99 (NAVD88)

PLANS FOR THESE IMPROVEMENTS: STREET:
SEWER: 36168-36170 WATER: W-3175
STORM DRAIN: 36204-36216
LANDSCAPE:

APPROVAL

FOR APPROVAL, SEE PLAN NO. 36204

STORM DRAIN PLANS TRACT 17703

LINES "G", "G-8" & "G-9"

CITY OF ANAHEIM

SHEET 9 OF 13

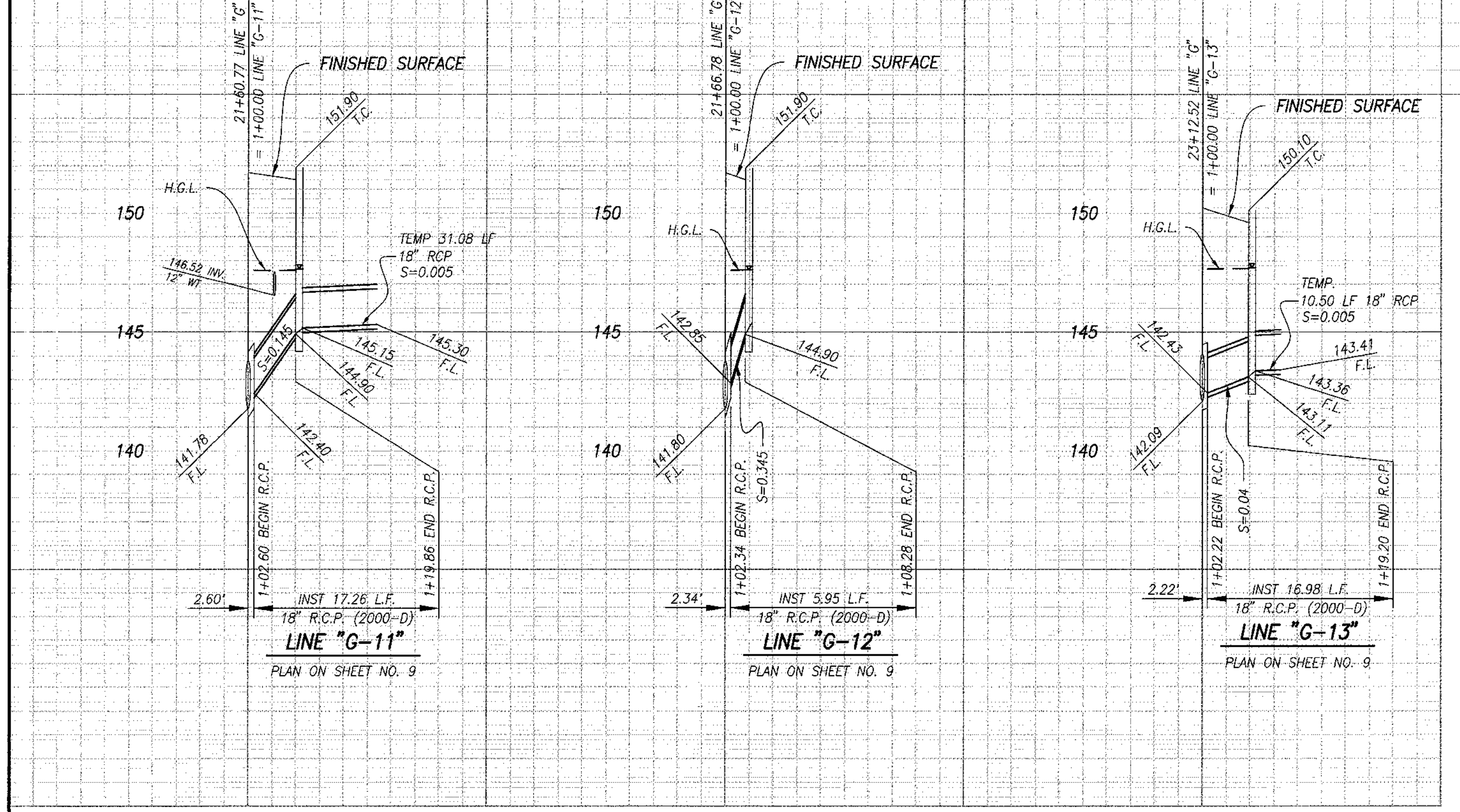
PLAN NO. 36212

FOR CITY USE ONLY — W.O. 3916-14 STORM DRAIN IMPROVEMENT PLANS — ROOM: BIN: DOC: 74026

D-108

36212

PLOTTED BY: Tiffany Nguyen DATE: Apr. 27, 2016 03:26:34 PM FILE: F:\0108\Engineering\TR_17703\Imp_Storm Drain\SHT-09.dwg



PROFILE SCALES
HORIZ.: 1"= 40'
VERT.: 1"= 4'

HYDRAULIC DATA

LINE	STA to STA	Q_{10}	DIA	So	n	Dc	Vc	Sc	Dn	Vn	Vf	Sf
"G"	10+25.50 11+10.36	27.9	30"	0.0214	0.013	1.80	7.37	0.0061	1.20	12.01	5.68	0.0046
"G"	11+10.36 11+75.92	27.9	30"	0.0020	0.013	1.80	7.37	0.0061	FULL	---	5.68	0.0046
"G"	11+75.92 13+18.22	23.6	30"	0.0020	0.013	1.65	6.85	0.0055	FULL	---	4.81	0.0033
"G"	13+22.89 13+27.69	22.2	30"	0.0020	0.013	1.60	6.68	0.0053	FULL	---	4.52	0.0029
"G"	13+27.69 14+21.28	19.7	30"	0.0020	0.013	1.51	6.38	0.0051	1.82	5.16	4.01	0.0023
"G"	14+21.28 15+56.14	14.6	30"	0.0020	0.013	1.29	5.73	0.0046	1.47	4.87	2.97	0.0013
"G"	15+56.14 15+80.16	12.1	30"	0.0020	0.013	1.17	5.38	0.0044	1.31	4.66	2.46	0.0009
"G"	15+84.82 16+81.31	9.2	24"	0.0020	0.013	1.08	5.30	0.0051	1.28	4.32	2.93	0.0017
"G"	16+81.31 17+22.26	7.9	24"	0.0020	0.013	1.00	5.03	0.0049	1.16	4.18	2.51	0.0012

HYDRAULIC DATA

LINE	STA to STA	Q_{10}	DIA	So	n	Dc	Vc	Sc	Dn	Vn	Vf	Sf
"G1"	1+04.17 1+18.38	4.4	18"	0.0100	0.013	0.80	4.56	0.0056	0.68	5.68	2.49	0.0018
"G1"	1+21.38 1+31.88	3.2	18"	0.0050	0.013	0.68	4.10	0.0052	0.69	4.05	1.81	0.0009
"G2"	1+02.20 1+29.00	1.5	18"	0.0800	0.013	0.46	3.27	0.0049	0.23	8.78	0.85	0.0002
"G3"	1+02.02 1+41.49	3.0	18"	0.0070	0.013	0.66	4.02	0.0051	0.66	3.98	1.70	0.0008
"G3"	1+48.81 1+56.81	3.0	18"	0.1000	0.013	0.66	4.02	0.0051	0.30	11.68	1.70	0.0008
"G4"	1+03.53 1+29.98	5.3	18"	0.0030	0.013	0.89	4.87	0.0059	FULL	---	3.00	0.0025
"G5"	1+04.17 1+19.03	2.8	18"	0.1900	0.013	0.64	3.93	0.0051	0.26	13.84	1.58	0.0007
"G5"	1+19.03 1+47.03	2.8	18"	0.0020	0.013	0.64	3.93	0.0051	0.83	2.77	1.58	0.0007
"G6"	1+02.47 1+31.15	3.4	18"	0.0020	0.013	0.70	4.18	0.0052	0.95	2.90	1.92	0.0010
"G7"	1+03.71 1+20.24	2.0	18"	0.0561	0.013	0.53	3.55	0.0049	0.29	8.45	1.13	0.0004
"G7"	1+20.24 1+28.52	2.0	18"	0.2923	0.013	0.53	3.55	0.0049	0.19	15.09	1.13	0.0004
"G7"	1+28.52 1+59.34	2.0	18"	0.0020	0.013	0.53	3.55	0.0049	0.68	2.55	1.13	0.0004
"G10"	1+02.20 1+24.70	0.8	18"	0.1230	0.013	0.33	2.74	0.0050	0.15	8.45	0.45	0.0001
"G11"	1+02.60 1+19.86	2.8	18"	0.1450	0.013	0.64	3.93	0.0051	0.27	13.04	1.58	0.0007
"G12"	1+02.34 1+08.28	0.5	18"	0.3450	0.013	0.26	2.42	0.0052	0.10	10.52	0.28	0.0000
"G13"	1+02.22 1+19.20	2.5	18"	0.0400	0.013	0.60	3.80	0.0050	0.35	7.99	1.41	0.0006

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REVISIONS

NO.	INIT.	DATE	DESCRIPTION	DATE	APP'D
⚠1	T.T.	11/7/16	REPLACED 18" RCP WITH 5 - 8" PVC SCH-80 BETWEEN TWO MODIFIED MH OF LINE "G-3"		

REFERENCES

BENCH MARK: 9A-22 ELEVATION: 151.99 (NAVD88)
KATELLA AVENUE/STATE COLLEGE BLVD.
BRASS CAP MKD C OF A BM, IN THE TOP OF CURB AT THE SE ECR.
ELEVATION: 151.99 (NAVD88)

PLANS FOR THESE IMPROVEMENTS: STREET:
SEWER: 36168-36170 WATER: W-3175
STORM DRAIN: 36204-36216
LANDSCAPE:

APPROVAL

FOR APPROVAL, SEE PLAN NO. 36204

ENGINEER:
HUNSAKER & ASSOCIATES
IRVINE, INC.
PLANNING ▪ ENGINEERING ▪ SURVEYING
Three Hughes ▪ Irvine, CA 92618
FX: (949) 583-0759 ▪ PH: (949) 583-1010
EDWARD A. MANDICH RCE NO. 59089 11-10-16 DATE
REGISTERED PROFESSIONAL ENGINEER EDWARD A. MANDICH No. 59089 CIVIL STATE OF CALIFORNIA

STORM DRAIN PLANS
TRACT 17703

LINES "G-3" - "G-7" & "G-10" - "G-13"

CITY OF ANAHEIM

RCP 2015-11013

OWNER:
PT METRO, LLC
25 ENTERPRISE, 3rd FLOOR
ALISO VIEJO, CA 92656
(949) 349-8000

SOILS ENGINEER:
GROUP DELTA CONSULTANTS
32 MAUCHLY, SUITE B
IRVINE, CA 92618
PH: (949) 450-2100

SHEET 10 OF 13

PLAN NO. 36213

FOR CITY USE ONLY W.O. 3916-14 STORM DRAIN IMPROVEMENT PLANS ROOM: BIN: DOC: 74026

D-108

36213

PLOTTED BY: Tu Trinh DATE: Nov. 09, 2016 09:41:15 AM FILE: F:\0108\Engineering\TR_17703\Imp_Storm Drain\SHT-10.dwg

APPROVED
HYDROLOGY CALCS AND MAP
FOR A-TOWN TRACT 17703

```
****************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
       (c) Copyright 1983-2013 Advanced Engineering Software (aes)
          Ver. 20.0  Release Date: 06/01/2013  License ID 1239

                      Analysis prepared by:

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

 ************************** DESCRIPTION OF STUDY **************************
 * W.O. #1855-150, A-TOWN METRO                                             *
 * 10-YR STUDY                                                              *
 * PROPOSED CONDITION                                                       *
 **************************************************************************

  FILE NAME: 17703.DAT
  TIME/DATE OF STUDY: 20:01 03/23/2015
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                   --*TIME-OF-CONCENTRATION MODEL*--

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

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.  (FT)     (FT)     SIDE / SIDE/ WAY    (FT)   (FT)  (FT)   (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

****************************************************************************
  FLOW PROCESS FROM NODE     1.00 TO NODE     2.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   230.00
  ELEVATION DATA: UPSTREAM(FEET) =   151.75  DOWNSTREAM(FEET) =    149.08

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.525
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.485
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp         Ap       SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A       0.20     0.40      0.100     32    6.53
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.62
  TOTAL AREA(ACRES) =      0.20   PEAK FLOW RATE(CFS) =      0.62

****************************************************************************
  FLOW PROCESS FROM NODE     2.00 TO NODE     3.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  149.08  DOWNSTREAM ELEVATION(FEET) =  148.38
  STREET LENGTH(FEET) =   133.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 21.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  16.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.21
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.38
    HALFSTREET FLOOD WIDTH(FEET) =   12.66
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.86
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.71
  STREET FLOW TRAVEL TIME(MIN.) =   1.19   Tc(MIN.) =    7.71
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.166
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL  AREA      Fp         Ap       SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                 A       1.86     0.40      0.200     32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =    1.86    SUBAREA RUNOFF(CFS) =    5.17
  EFFECTIVE AREA(ACRES) =      2.06   AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.19
  TOTAL AREA(ACRES) =          2.1       PEAK FLOW RATE(CFS) =       5.73

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  15.97
  FLOW VELOCITY(FEET/SEC.) =  2.15   DEPTH*VELOCITY(FT*FT/SEC.) =   0.96
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     363.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   143.24  DOWNSTREAM(FEET) =   143.15
  FLOW LENGTH(FEET) =    41.00   MANNING'S N = 0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.26
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.73
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =    7.92
  LONGEST FLOWPATH FROM NODE       1.00 TO NODE      7.00 =     404.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =     7.92
  RAINFALL INTENSITY(INCH/HR) =   3.12
  AREA-AVERAGED Fm(INCH/HR) =  0.08
  AREA-AVERAGED Fp(INCH/HR) =  0.40
  AREA-AVERAGED Ap =  0.19
  EFFECTIVE STREAM AREA(ACRES) =        2.06
  TOTAL STREAM AREA(ACRES) =        2.06
  PEAK FLOW RATE(CFS) AT CONFLUENCE =         5.73

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      5.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    235.00
  ELEVATION DATA: UPSTREAM(FEET) =    151.75  DOWNSTREAM(FEET) =    149.08

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =     6.610
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.459
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                  A        0.21      0.40      0.100     32    6.61
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =       0.65
  TOTAL AREA(ACRES) =       0.21    PEAK FLOW RATE(CFS) =       0.65

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  149.08  DOWNSTREAM ELEVATION(FEET) =  147.65
  STREET LENGTH(FEET) =    185.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 21.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  16.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =        0.87
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.26
    HALFSTREET FLOOD WIDTH(FEET) =      6.53
    AVERAGE FLOW VELOCITY(FEET/SEC.) =     1.60
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =     0.41
  STREET FLOW TRAVEL TIME(MIN.) =    1.93    Tc(MIN.) =     8.54
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.988
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  A        0.17      0.40      0.100     32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.17     SUBAREA RUNOFF(CFS) =      0.45
  EFFECTIVE AREA(ACRES) =      0.38    AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.4       PEAK FLOW RATE(CFS) =        1.01

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =    6.97
  FLOW VELOCITY(FEET/SEC.) =  1.67   DEPTH*VELOCITY(FT*FT/SEC.) =   0.44
  LONGEST FLOWPATH FROM NODE       4.00 TO NODE      6.00 =     420.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =     8.54
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.988
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  APARTMENTS                  A        1.76      0.40      0.200     32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA AREA(ACRES) =     1.76     SUBAREA RUNOFF(CFS) =      4.61
  EFFECTIVE AREA(ACRES) =      2.14    AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.18
  TOTAL AREA(ACRES) =        2.1       PEAK FLOW RATE(CFS) =        5.61
```

```
****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.54
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.988
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap       SCS
       LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
  COMMERCIAL                   A        0.38      0.40       0.100     32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.38    SUBAREA RUNOFF(CFS) =     1.01
  EFFECTIVE AREA(ACRES) =       2.52   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.17
  TOTAL AREA(ACRES) =          2.5      PEAK FLOW RATE(CFS) =        6.62

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   143.49  DOWNSTREAM(FEET) =   143.15
  FLOW LENGTH(FEET) =     13.50    MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.55
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =         6.62
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =     8.56
  LONGEST FLOWPATH FROM NODE       4.00 TO NODE       7.00 =      433.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =     8.56
  RAINFALL INTENSITY(INCH/HR) =   2.98
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.40
  AREA-AVERAGED Ap =  0.17
  EFFECTIVE STREAM AREA(ACRES) =         2.52
  TOTAL STREAM AREA(ACRES) =         2.52
  PEAK FLOW RATE(CFS) AT CONFLUENCE =         6.62

  ** CONFLUENCE DATA **
   STREAM        Q       Tc   Intensity   Fp(Fm)       Ap       Ae      HEADWATER
   NUMBER      (CFS)  (MIN.) (INCH/HR) (INCH/HR)            (ACRES)    NODE
      1         5.73     7.92     3.118  0.40( 0.08) 0.19         2.1        1.00
      2         6.62     8.56     2.983  0.40( 0.07) 0.17         2.5        4.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM        Q       Tc   Intensity   Fp(Fm)       Ap       Ae      HEADWATER
   NUMBER      (CFS)  (MIN.) (INCH/HR) (INCH/HR)            (ACRES)    NODE
      1        12.14     7.92     3.118  0.40( 0.07) 0.18         4.4        1.00
      2        12.10     8.56     2.983  0.40( 0.07) 0.18         4.6        4.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       12.14    Tc(MIN.) =       7.92
  EFFECTIVE AREA(ACRES) =        4.39   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.18
  TOTAL AREA(ACRES) =          4.6
  LONGEST FLOWPATH FROM NODE       4.00 TO NODE       7.00 =      433.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      8.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    143.15  DOWNSTREAM(FEET) =   143.04
  FLOW LENGTH(FEET) =      55.80    MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.73
  ESTIMATED PIPE DIAMETER(INCH) =  27.00     NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =        12.14
  PIPE TRAVEL TIME(MIN.) =   0.25     Tc(MIN.) =      8.17
  LONGEST FLOWPATH FROM NODE       4.00 TO NODE       8.00 =      489.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.17
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.063
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap       SCS
       LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
  COMMERCIAL                   A        0.66      0.40       0.100     32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =     0.66    SUBAREA RUNOFF(CFS) =     1.80
  EFFECTIVE AREA(ACRES) =       5.05   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.17
  TOTAL AREA(ACRES) =          5.2      PEAK FLOW RATE(CFS) =       13.62

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
```

```
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    300.00
 ELEVATION DATA: UPSTREAM(FEET) =    152.08  DOWNSTREAM(FEET) =     148.28

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =     7.132
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.312
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap       SCS    Tc
     LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN   (MIN.)
 COMMERCIAL                  A        0.35      0.40      0.100     32    7.13
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =       1.03
 TOTAL AREA(ACRES) =       0.35   PEAK FLOW RATE(CFS) =        1.03

****************************************************************************
 FLOW PROCESS FROM NODE      12.00 TO NODE      13.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  148.28  DOWNSTREAM ELEVATION(FEET) =  147.40
 STREET LENGTH(FEET) =    113.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 24.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  19.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =        1.38
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.29
   HALFSTREET FLOOD WIDTH(FEET) =      8.08
   AVERAGE FLOW VELOCITY(FEET/SEC.) =      1.80
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =      0.52
 STREET FLOW TRAVEL TIME(MIN.) =    1.05    Tc(MIN.) =      8.18
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.062
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap       SCS
     LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
 COMMERCIAL                  A        0.26      0.40      0.100     32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =      0.26     SUBAREA RUNOFF(CFS) =      0.71
 EFFECTIVE AREA(ACRES) =        0.61    AREA-AVERAGED Fm(INCH/HR) =  0.04
 AREA-AVERAGED Fp(INCH/HR) =  0.40   AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =          0.6         PEAK FLOW RATE(CFS) =        1.66

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.30    HALFSTREET FLOOD WIDTH(FEET) =    8.82
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 FLOW VELOCITY(FEET/SEC.) =  1.85   DEPTH*VELOCITY(FT*FT/SEC.) =   0.56
 LONGEST FLOWPATH FROM NODE      11.00 TO NODE      13.00 =      413.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      13.00 TO NODE      13.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =     8.18
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.062
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap       SCS
     LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
 APARTMENTS                  A        1.96      0.40      0.200     32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =      1.96     SUBAREA RUNOFF(CFS) =      5.26
 EFFECTIVE AREA(ACRES) =        2.57    AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.40   AREA-AVERAGED Ap =  0.18
 TOTAL AREA(ACRES) =          2.6         PEAK FLOW RATE(CFS) =        6.92

****************************************************************************
 FLOW PROCESS FROM NODE      13.00 TO NODE      14.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    143.21  DOWNSTREAM(FEET) =    143.15
 FLOW LENGTH(FEET) =      28.60    MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  14.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =    3.39
 ESTIMATED PIPE DIAMETER(INCH) =  24.00      NUMBER OF PIPES =    1
 PIPE-FLOW(CFS) =        6.92
 PIPE TRAVEL TIME(MIN.) =    0.14     Tc(MIN.) =      8.32
 LONGEST FLOWPATH FROM NODE      11.00 TO NODE      14.00 =      441.60 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      14.00 TO NODE      14.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =     8.32
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.032
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap       SCS
     LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
 COMMERCIAL                  A        0.77      0.40      0.100     32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =      0.77     SUBAREA RUNOFF(CFS) =      2.07
 EFFECTIVE AREA(ACRES) =        3.34    AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.40   AREA-AVERAGED Ap =  0.16
 TOTAL AREA(ACRES) =          3.3         PEAK FLOW RATE(CFS) =        8.92

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

```
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   245.00
 ELEVATION DATA: UPSTREAM(FEET) =    154.00  DOWNSTREAM(FEET) =    151.70

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.442
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.232
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap      SCS    Tc
      LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN   (MIN.)
 APARTMENTS                   A       0.66      0.40      0.200     32    7.44
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA RUNOFF(CFS) =        1.87
 TOTAL AREA(ACRES) =        0.66   PEAK FLOW RATE(CFS) =        1.87

****************************************************************************
 FLOW PROCESS FROM NODE      22.00 TO NODE      23.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  151.70  DOWNSTREAM ELEVATION(FEET) =  150.90
 STREET LENGTH(FEET) =    325.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 15.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)   =  0.020

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =        4.37
   ***STREET FLOW SPLITS OVER STREET-CROWN***
   FULL DEPTH(FEET) =     0.43   FLOOD WIDTH(FEET) =    15.00
   FULL HALF-STREET VELOCITY(FEET/SEC.) =      1.41
   SPLIT DEPTH(FEET) =     0.31   SPLIT FLOOD WIDTH(FEET) =     9.26
   SPLIT FLOW(CFS) =     1.04   SPLIT VELOCITY(FEET/SEC.) =     1.06
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.43
   HALFSTREET FLOOD WIDTH(FEET) =    15.00
   AVERAGE FLOW VELOCITY(FEET/SEC.) =     1.41
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =      0.60
 STREET FLOW TRAVEL TIME(MIN.) =   3.85    Tc(MIN.) =    11.29
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.545
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap      SCS
      LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 APARTMENTS                   A       2.25      0.40      0.200     32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =     2.25      SUBAREA RUNOFF(CFS) =      4.99
 EFFECTIVE AREA(ACRES) =        2.91    AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =         2.9         PEAK FLOW RATE(CFS) =         6.46

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  15.00
 FLOW VELOCITY(FEET/SEC.) =  1.41   DEPTH*VELOCITY(FT*FT/SEC.) =   0.60
 LONGEST FLOWPATH FROM NODE      21.00 TO NODE      23.00 =      570.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      23.00 TO NODE      24.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    145.49  DOWNSTREAM(FEET) =    145.28
 FLOW LENGTH(FEET) =     89.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.43
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =        6.46
 PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =    11.73
 LONGEST FLOWPATH FROM NODE      21.00 TO NODE      24.00 =      659.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      24.00 TO NODE      24.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    11.73
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.491
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap      SCS
      LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                   A       0.48      0.40      0.100     32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.48      SUBAREA RUNOFF(CFS) =      1.06
 EFFECTIVE AREA(ACRES) =        3.39    AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.19
 TOTAL AREA(ACRES) =         3.4         PEAK FLOW RATE(CFS) =         7.37

****************************************************************************
 FLOW PROCESS FROM NODE      24.00 TO NODE      30.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    145.28  DOWNSTREAM(FEET) =    143.40
 FLOW LENGTH(FEET) =    348.60   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.91
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =        7.37
```

```
 PIPE TRAVEL TIME(MIN.) =   1.18    Tc(MIN.) =   12.91
 LONGEST FLOWPATH FROM NODE      21.00 TO NODE      30.00 =    1007.60 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      30.00 TO NODE      30.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   12.91
 RAINFALL INTENSITY(INCH/HR) =   2.36
 AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.40
 AREA-AVERAGED Ap =  0.19
 EFFECTIVE STREAM AREA(ACRES) =        3.39
 TOTAL STREAM AREA(ACRES) =        3.39
 PEAK FLOW RATE(CFS) AT CONFLUENCE =        7.37

****************************************************************************
 FLOW PROCESS FROM NODE      25.00 TO NODE      26.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   250.00
 ELEVATION DATA: UPSTREAM(FEET) =    153.50  DOWNSTREAM(FEET) =    151.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.408
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.241
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS    Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN   (MIN.)
 APARTMENTS                  A        0.60      0.40      0.200     32     7.41
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA RUNOFF(CFS) =      1.71
 TOTAL AREA(ACRES) =       0.60   PEAK FLOW RATE(CFS) =       1.71

****************************************************************************
 FLOW PROCESS FROM NODE      26.00 TO NODE      27.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    151.00  DOWNSTREAM(FEET) =    150.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   110.00   CHANNEL SLOPE =  0.0091
 CHANNEL BASE(FEET) =     5.00   "Z" FACTOR =   5.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =    1.00
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.076
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
 APARTMENTS                  A        0.56      0.40      0.200     32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =        2.46
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =    2.60
 AVERAGE FLOW DEPTH(FEET) =    0.16   TRAVEL TIME(MIN.) =    0.71
 Tc(MIN.) =     8.11
 SUBAREA AREA(ACRES) =       0.56        SUBAREA RUNOFF(CFS) =      1.51
 EFFECTIVE AREA(ACRES) =        1.16     AREA-AVERAGED Fm(INCH/HR) =    0.08
 AREA-AVERAGED Fp(INCH/HR) =    0.40  AREA-AVERAGED Ap =    0.20
 TOTAL AREA(ACRES) =         1.2          PEAK FLOW RATE(CFS) =         3.13

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.19   FLOW VELOCITY(FEET/SEC.) =    2.80
 LONGEST FLOWPATH FROM NODE      25.00 TO NODE      27.00 =     360.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      27.00 TO NODE      28.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    144.50  DOWNSTREAM(FEET) =    144.30
 FLOW LENGTH(FEET) =     70.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS    9.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =    3.14
 ESTIMATED PIPE DIAMETER(INCH) =   18.00     NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      3.13
 PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =     8.49
 LONGEST FLOWPATH FROM NODE      25.00 TO NODE      28.00 =     430.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      28.00 TO NODE      28.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =     8.49
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.998
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
 APARTMENTS                  A        1.54      0.40      0.200     32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =       1.54     SUBAREA RUNOFF(CFS) =      4.04
 EFFECTIVE AREA(ACRES) =        2.70    AREA-AVERAGED Fm(INCH/HR) =   0.08
 AREA-AVERAGED Fp(INCH/HR) =   0.40   AREA-AVERAGED Ap =   0.20
 TOTAL AREA(ACRES) =         2.7        PEAK FLOW RATE(CFS) =         7.09

****************************************************************************
 FLOW PROCESS FROM NODE      28.00 TO NODE      29.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    144.30  DOWNSTREAM(FEET) =    144.00
 FLOW LENGTH(FEET) =     85.40   MANNING'S N =  0.013
```

```
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.11
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       7.09
 PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =     8.83
 LONGEST FLOWPATH FROM NODE      25.00 TO NODE      29.00 =      515.40 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      29.00 TO NODE      29.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =     8.83
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.930
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  A        0.71       0.40      0.100     32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.71     SUBAREA RUNOFF(CFS) =      1.85
 EFFECTIVE AREA(ACRES) =      3.41   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.40   AREA-AVERAGED Ap =  0.18
 TOTAL AREA(ACRES) =        3.4       PEAK FLOW RATE(CFS) =       8.77

****************************************************************************
 FLOW PROCESS FROM NODE      29.00 TO NODE      30.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   144.00  DOWNSTREAM(FEET) =   143.40
 FLOW LENGTH(FEET) =     43.20   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.28
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       8.77
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =     8.93
 LONGEST FLOWPATH FROM NODE      25.00 TO NODE      30.00 =      558.60 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      30.00 TO NODE      30.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =     8.93
 RAINFALL INTENSITY(INCH/HR) =    2.91
 AREA-AVERAGED Fm(INCH/HR) =   0.07
 AREA-AVERAGED Fp(INCH/HR) =   0.40
 AREA-AVERAGED Ap =   0.18
 EFFECTIVE STREAM AREA(ACRES) =        3.41
 TOTAL STREAM AREA(ACRES) =        3.41
 PEAK FLOW RATE(CFS) AT CONFLUENCE =        8.77
```

```
 ** CONFLUENCE DATA **
 STREAM       Q       Tc     Intensity    Fp(Fm)      Ap       Ae     HEADWATER
 NUMBER     (CFS)   (MIN.)  (INCH/HR)   (INCH/HR)           (ACRES)    NODE
    1        7.37    12.91      2.358   0.40( 0.07) 0.19         3.4      21.00
    2        8.77     8.93      2.911   0.40( 0.07) 0.18         3.4      25.00

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

 ** PEAK FLOW RATE TABLE **
 STREAM       Q       Tc     Intensity    Fp(Fm)      Ap       Ae     HEADWATER
 NUMBER     (CFS)   (MIN.)  (INCH/HR)   (INCH/HR)           (ACRES)    NODE
    1       15.11     8.93      2.911   0.40( 0.07) 0.18         5.8      25.00
    2       14.43    12.91      2.358   0.40( 0.07) 0.18         6.8      21.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      15.11    Tc(MIN.) =      8.93
 EFFECTIVE AREA(ACRES) =       5.76   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.40   AREA-AVERAGED Ap =  0.18
 TOTAL AREA(ACRES) =        6.8
 LONGEST FLOWPATH FROM NODE      21.00 TO NODE      30.00 =     1007.60 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      31.00 TO NODE      32.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    300.00
 ELEVATION DATA: UPSTREAM(FEET) =    152.00  DOWNSTREAM(FEET) =    150.05

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    12.948
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.353
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 PUBLIC PARK                 A        1.38       0.40      0.850     32   12.95
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
 SUBAREA RUNOFF(CFS) =      2.50
 TOTAL AREA(ACRES) =        1.38   PEAK FLOW RATE(CFS) =       2.50

****************************************************************************
 FLOW PROCESS FROM NODE      32.00 TO NODE      32.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    12.95
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.353
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  A        0.33       0.40      0.100     32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
```

```
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.33     SUBAREA RUNOFF(CFS) =     0.69
 EFFECTIVE AREA(ACRES) =      1.71   AREA-AVERAGED Fm(INCH/HR) =  0.28
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.71
 TOTAL AREA(ACRES) =        1.7       PEAK FLOW RATE(CFS) =        3.19

****************************************************************************
 FLOW PROCESS FROM NODE      32.00 TO NODE      33.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   142.10  DOWNSTREAM(FEET) =   141.80
 FLOW LENGTH(FEET) =   172.00    MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.59
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.19
 PIPE TRAVEL TIME(MIN.) =   1.11    Tc(MIN.) =    14.05
 LONGEST FLOWPATH FROM NODE      31.00 TO NODE      33.00 =     472.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      33.00 TO NODE      33.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    14.05
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.245
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE               GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                    A        0.24      0.40      0.100     32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.24     SUBAREA RUNOFF(CFS) =     0.48
 EFFECTIVE AREA(ACRES) =      1.95   AREA-AVERAGED Fm(INCH/HR) =  0.25
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.63
 TOTAL AREA(ACRES) =        2.0       PEAK FLOW RATE(CFS) =        3.50

****************************************************************************
 FLOW PROCESS FROM NODE      33.00 TO NODE      34.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   141.80  DOWNSTREAM(FEET) =   141.77
 FLOW LENGTH(FEET) =      6.00    MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.98
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.50
 PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    14.08
 LONGEST FLOWPATH FROM NODE      31.00 TO NODE      34.00 =     478.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      34.00 TO NODE      34.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    14.08
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.243
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE               GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 APARTMENTS                    A        1.44      0.40      0.200     32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =     1.44     SUBAREA RUNOFF(CFS) =     2.80
 EFFECTIVE AREA(ACRES) =      3.39   AREA-AVERAGED Fm(INCH/HR) =  0.18
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.45
 TOTAL AREA(ACRES) =        3.4       PEAK FLOW RATE(CFS) =        6.30

****************************************************************************
 FLOW PROCESS FROM NODE      34.00 TO NODE      35.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   141.77  DOWNSTREAM(FEET) =   141.72
 FLOW LENGTH(FEET) =    34.00    MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.89
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       6.30
 PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    14.28
 LONGEST FLOWPATH FROM NODE      31.00 TO NODE      35.00 =     512.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      35.00 TO NODE      35.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    14.28
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.225
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
      LAND USE               GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                    A        0.39      0.40      0.100     32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.39     SUBAREA RUNOFF(CFS) =     0.77
 EFFECTIVE AREA(ACRES) =      3.78   AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.41
 TOTAL AREA(ACRES) =        3.8       PEAK FLOW RATE(CFS) =        7.01

****************************************************************************
 FLOW PROCESS FROM NODE      35.00 TO NODE      36.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
ELEVATION DATA: UPSTREAM(FEET) =   141.72  DOWNSTREAM(FEET) =   141.12
FLOW LENGTH(FEET) =   297.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   3.35
ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =        7.01
PIPE TRAVEL TIME(MIN.) =   1.48    Tc(MIN.) =   15.75
LONGEST FLOWPATH FROM NODE     31.00 TO NODE     36.00 =     809.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MIN.) =   15.75
RAINFALL INTENSITY(INCH/HR) =   2.10
AREA-AVERAGED Fm(INCH/HR) =  0.16
AREA-AVERAGED Fp(INCH/HR) =  0.40
AREA-AVERAGED Ap =  0.41
EFFECTIVE STREAM AREA(ACRES) =       3.78
TOTAL STREAM AREA(ACRES) =       3.78
PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.01

****************************************************************************
FLOW PROCESS FROM NODE     35.10 TO NODE     36.00 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =   246.00
ELEVATION DATA: UPSTREAM(FEET) =   152.22  DOWNSTREAM(FEET) =   150.75

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.655
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.180
SUBAREA Tc AND LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp          Ap      SCS   Tc
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
COMMERCIAL                 A        0.30      0.40      0.100    32    7.66
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
SUBAREA RUNOFF(CFS) =       0.85
TOTAL AREA(ACRES) =       0.30   PEAK FLOW RATE(CFS) =       0.85

****************************************************************************
FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =    7.66
RAINFALL INTENSITY(INCH/HR) =   3.18
AREA-AVERAGED Fm(INCH/HR) =  0.04
AREA-AVERAGED Fp(INCH/HR) =  0.40
AREA-AVERAGED Ap =  0.10
EFFECTIVE STREAM AREA(ACRES) =       0.30
TOTAL STREAM AREA(ACRES) =       0.30
PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.85

** CONFLUENCE DATA **
 STREAM       Q       Tc    Intensity   Fp(Fm)       Ap      Ae      HEADWATER
 NUMBER     (CFS)   (MIN.)  (INCH/HR)  (INCH/HR)           (ACRES)     NODE
    1        7.01   15.75     2.103   0.40( 0.16) 0.41       3.8       31.00
    2        0.85    7.66     3.180   0.40( 0.04) 0.10       0.3       35.10

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

** PEAK FLOW RATE TABLE **
 STREAM       Q       Tc    Intensity   Fp(Fm)       Ap      Ae      HEADWATER
 NUMBER     (CFS)   (MIN.)  (INCH/HR)  (INCH/HR)           (ACRES)     NODE
    1        6.15    7.66     3.180   0.40( 0.15) 0.37       2.1       35.10
    2        7.57   15.75     2.103   0.40( 0.16) 0.39       4.1       31.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =       7.57    Tc(MIN.) =    15.75
EFFECTIVE AREA(ACRES) =       4.08   AREA-AVERAGED Fm(INCH/HR) =  0.16
AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.39
TOTAL AREA(ACRES) =       4.1
LONGEST FLOWPATH FROM NODE     31.00 TO NODE     36.00 =     809.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     36.00 TO NODE     37.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   141.12  DOWNSTREAM(FEET) =   141.07
FLOW LENGTH(FEET) =    15.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   4.07
ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =        7.57
PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   15.82
LONGEST FLOWPATH FROM NODE     31.00 TO NODE     37.00 =     824.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     37.00 TO NODE     37.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MIN.) =   15.82
RAINFALL INTENSITY(INCH/HR) =   2.10
AREA-AVERAGED Fm(INCH/HR) =  0.16
AREA-AVERAGED Fp(INCH/HR) =  0.40
AREA-AVERAGED Ap =  0.39
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EFFECTIVE STREAM AREA(ACRES) =        4.08 .
TOTAL STREAM AREA(ACRES) =        4.08
PEAK FLOW RATE(CFS) AT CONFLUENCE =        7.57

****************************************************************************
FLOW PROCESS FROM NODE     36.10 TO NODE     37.00 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =   250.00
ELEVATION DATA: UPSTREAM(FEET) =    152.22  DOWNSTREAM(FEET) =    150.75

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.730
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.163
SUBAREA Tc AND LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
COMMERCIAL                  A        0.19      0.40      0.100    32    7.73
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
SUBAREA RUNOFF(CFS) =       0.53
TOTAL AREA(ACRES) =       0.19   PEAK FLOW RATE(CFS) =       0.53

****************************************************************************
FLOW PROCESS FROM NODE     37.00 TO NODE     37.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =     7.73
RAINFALL INTENSITY(INCH/HR) =   3.16
AREA-AVERAGED Fm(INCH/HR) =  0.04
AREA-AVERAGED Fp(INCH/HR) =  0.40
AREA-AVERAGED Ap =  0.10
EFFECTIVE STREAM AREA(ACRES) =        0.19
TOTAL STREAM AREA(ACRES) =        0.19
PEAK FLOW RATE(CFS) AT CONFLUENCE =        0.53
```

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	6.15	7.72	3.165	0.40(0.15)	0.37	2.1	35.10
1	7.57	15.82	2.099	0.40(0.16)	0.39	4.1	31.00
2	0.53	7.73	3.163	0.40(0.04)	0.10	0.2	36.10

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	6.68	7.72	3.165	0.40(0.14)	0.35	2.3	35.10
2	6.68	7.73	3.163	0.40(0.14)	0.35	2.3	36.10
3	7.92	15.82	2.099	0.40(0.15)	0.38	4.3	31.00

```
COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =        7.92    Tc(MIN.) =    15.82
EFFECTIVE AREA(ACRES) =        4.27   AREA-AVERAGED Fm(INCH/HR) =  0.15
AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.38
TOTAL AREA(ACRES) =        4.3
LONGEST FLOWPATH FROM NODE      31.00 TO NODE      37.00 =      824.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     37.00 TO NODE     38.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    141.07  DOWNSTREAM(FEET) =    140.67
FLOW LENGTH(FEET) =    136.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.7 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =    3.86
ESTIMATED PIPE DIAMETER(INCH) =  21.00     NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =       7.92
PIPE TRAVEL TIME(MIN.) =   0.59    Tc(MIN.) =    16.40
LONGEST FLOWPATH FROM NODE      31.00 TO NODE      38.00 =      960.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     38.00 TO NODE     38.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MIN.) =   16.40
RAINFALL INTENSITY(INCH/HR) =   2.06
AREA-AVERAGED Fm(INCH/HR) =  0.15
AREA-AVERAGED Fp(INCH/HR) =  0.40
AREA-AVERAGED Ap =  0.38
EFFECTIVE STREAM AREA(ACRES) =        4.27
TOTAL STREAM AREA(ACRES) =        4.27
PEAK FLOW RATE(CFS) AT CONFLUENCE =        7.92

****************************************************************************
FLOW PROCESS FROM NODE     37.10 TO NODE     38.00 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
ELEVATION DATA: UPSTREAM(FEET) =    148.90  DOWNSTREAM(FEET) =    145.59

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.814
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.143
SUBAREA Tc AND LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
```

```
 APARTMENTS                    A        0.73      0.40     0.200    32    7.81
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA RUNOFF(CFS) =       2.01
 TOTAL AREA(ACRES) =        0.73    PEAK FLOW RATE(CFS) =        2.01

****************************************************************************
 FLOW PROCESS FROM NODE      38.00 TO NODE      38.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    7.81
 RAINFALL INTENSITY(INCH/HR) =   3.14
 AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.40
 AREA-AVERAGED Ap =  0.20
 EFFECTIVE STREAM AREA(ACRES) =        0.73
 TOTAL STREAM AREA(ACRES) =        0.73
 PEAK FLOW RATE(CFS) AT CONFLUENCE =        2.01

 ** CONFLUENCE DATA **
  STREAM        Q       Tc   Intensity   Fp(Fm)      Ap       Ae      HEADWATER
  NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)            (ACRES)     NODE
     1         6.68    8.32     3.032  0.40( 0.14) 0.35        2.3       35.10
     1         6.68    8.33     3.030  0.40( 0.14) 0.35        2.3       36.10
     1         7.92   16.40     2.055  0.40( 0.15) 0.38        4.3       31.00
     2         2.01    7.81     3.143  0.40( 0.08) 0.20        0.7       37.10

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

 ** PEAK FLOW RATE TABLE **
  STREAM        Q       Tc   Intensity   Fp(Fm)      Ap       Ae      HEADWATER
  NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)            (ACRES)     NODE
     1         8.53    7.81     3.143  0.40( 0.12) 0.31        2.9       37.10
     2         8.62    8.32     3.032  0.40( 0.12) 0.31        3.1       35.10
     3         8.62    8.33     3.030  0.40( 0.12) 0.31        3.1       36.10
     4         9.22   16.40     2.055  0.40( 0.14) 0.35        5.0       31.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       9.22    Tc(MIN.) =      16.40
 EFFECTIVE AREA(ACRES) =         5.00   AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.35
 TOTAL AREA(ACRES) =          5.0
 LONGEST FLOWPATH FROM NODE      31.00 TO NODE      38.00 =      960.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      38.00 TO NODE      39.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    140.67  DOWNSTREAM(FEET) =    140.12
```

```
 FLOW LENGTH(FEET) =     99.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =    5.20
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =        9.22
 PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =    16.72
 LONGEST FLOWPATH FROM NODE      31.00 TO NODE      39.00 =     1059.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      39.00 TO NODE      39.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   16.72
 RAINFALL INTENSITY(INCH/HR) =   2.03
 AREA-AVERAGED Fm(INCH/HR) =  0.14
 AREA-AVERAGED Fp(INCH/HR) =  0.40
 AREA-AVERAGED Ap =  0.35
 EFFECTIVE STREAM AREA(ACRES) =        5.00
 TOTAL STREAM AREA(ACRES) =        5.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =        9.22

****************************************************************************
 FLOW PROCESS FROM NODE      38.10 TO NODE      39.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    300.00
 ELEVATION DATA: UPSTREAM(FEET) =    151.20  DOWNSTREAM(FEET) =    150.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.572
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.798
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap       SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 APARTMENTS                  A        1.40      0.40     0.200    32    9.57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA RUNOFF(CFS) =       3.42
 TOTAL AREA(ACRES) =        1.40    PEAK FLOW RATE(CFS) =        3.42

****************************************************************************
 FLOW PROCESS FROM NODE      39.00 TO NODE      39.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    9.57
 RAINFALL INTENSITY(INCH/HR) =   2.80
 AREA-AVERAGED Fm(INCH/HR) =  0.08
```

```
AREA-AVERAGED Fp(INCH/HR) =  0.40
AREA-AVERAGED Ap =  0.20
EFFECTIVE STREAM AREA(ACRES) =        1.40
TOTAL STREAM AREA(ACRES) =        1.40
PEAK FLOW RATE(CFS) AT CONFLUENCE =        3.42

** CONFLUENCE DATA **
 STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
 NUMBER     (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)          (ACRES)    NODE
    1        8.53    8.14     3.071   0.40( 0.12) 0.31       2.9      37.10
    1        8.62    8.64     2.967   0.40( 0.12) 0.31       3.1      35.10
    1        8.62    8.65     2.965   0.40( 0.12) 0.31       3.1      36.10
    1        9.22   16.72     2.033   0.40( 0.14) 0.35       5.0      31.00
    2        3.42    9.57     2.798   0.40( 0.08) 0.20       1.4      38.10

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

** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
 NUMBER     (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)          (ACRES)    NODE
    1       11.73    8.14     3.071   0.40( 0.11) 0.28       4.1      37.10
    2       11.90    8.64     2.967   0.40( 0.11) 0.28       4.3      35.10
    3       11.91    8.65     2.965   0.40( 0.11) 0.28       4.3      36.10
    4       12.11    9.57     2.798   0.40( 0.11) 0.28       4.7      38.10
    5       11.68   16.72     2.033   0.40( 0.13) 0.32       6.4      31.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =      12.11     Tc(MIN.) =     9.57
EFFECTIVE AREA(ACRES) =       4.68   AREA-AVERAGED Fm(INCH/HR) =  0.11
AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.28
TOTAL AREA(ACRES) =       6.4
LONGEST FLOWPATH FROM NODE      31.00 TO NODE      39.00 =    1059.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      39.00 TO NODE      40.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    140.12  DOWNSTREAM(FEET) =    139.79
 FLOW LENGTH(FEET) =     26.00   MANNING'S N = 0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.65
 ESTIMATED PIPE DIAMETER(INCH) =  21.00     NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      12.11
 PIPE TRAVEL TIME(MIN.) =   0.06     Tc(MIN.) =     9.63
 LONGEST FLOWPATH FROM NODE      31.00 TO NODE      40.00 =    1085.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      40.00 TO NODE      40.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
```

```
 TIME OF CONCENTRATION(MIN.) =     9.63
 RAINFALL INTENSITY(INCH/HR) =    2.79
 AREA-AVERAGED Fm(INCH/HR) =  0.11
 AREA-AVERAGED Fp(INCH/HR) =  0.40
 AREA-AVERAGED Ap =  0.28
 EFFECTIVE STREAM AREA(ACRES) =        4.68
 TOTAL STREAM AREA(ACRES) =        6.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       12.11

****************************************************************************
 FLOW PROCESS FROM NODE      39.10 TO NODE      40.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    300.00
 ELEVATION DATA: UPSTREAM(FEET) =    147.50  DOWNSTREAM(FEET) =    144.52

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =     7.979
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.106
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp           Ap      SCS   Tc
      LAND USE             GROUP    (ACRES)  (INCH/HR)  (DECIMAL)   CN  (MIN.)
 APARTMENTS                  A        1.01      0.40      0.200     32    7.98
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA RUNOFF(CFS) =       2.75
 TOTAL AREA(ACRES) =       1.01    PEAK FLOW RATE(CFS) =       2.75

****************************************************************************
 FLOW PROCESS FROM NODE      40.00 TO NODE      40.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =     7.98
 RAINFALL INTENSITY(INCH/HR) =    3.11
 AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.40
 AREA-AVERAGED Ap =  0.20
 EFFECTIVE STREAM AREA(ACRES) =        1.01
 TOTAL STREAM AREA(ACRES) =        1.01
 PEAK FLOW RATE(CFS) AT CONFLUENCE =        2.75

 ** CONFLUENCE DATA **
 STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
 NUMBER     (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)          (ACRES)    NODE
    1       11.73    8.19     3.059   0.40( 0.11) 0.28       4.1      37.10
    1       11.90    8.70     2.956   0.40( 0.11) 0.28       4.3      35.10
    1       11.91    8.71     2.954   0.40( 0.11) 0.28       4.3      36.10
    1       12.11    9.63     2.789   0.40( 0.11) 0.28       4.7      38.10
    1       11.68   16.78     2.029   0.40( 0.13) 0.32       6.4      31.00
    2        2.75    7.98     3.106   0.40( 0.08) 0.20       1.0      39.10
```

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	14.36	7.98	3.106	0.40(0.10)	0.26	5.0	39.10
2	14.44	8.19	3.059	0.40(0.10)	0.26	5.1	37.10
3	14.52	8.70	2.956	0.40(0.11)	0.26	5.3	35.10
4	14.52	8.71	2.954	0.40(0.11)	0.26	5.3	36.10
5	14.58	9.63	2.789	0.40(0.11)	0.27	5.7	38.10
6	13.45	16.78	2.029	0.40(0.12)	0.30	7.4	31.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 14.58 Tc(MIN.) = 9.63
EFFECTIVE AREA(ACRES) = 5.69 AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.27
TOTAL AREA(ACRES) = 7.4
LONGEST FLOWPATH FROM NODE 31.00 TO NODE 40.00 = 1085.00 FEET.

****
FLOW PROCESS FROM NODE 40.00 TO NODE 41.00 IS CODE = 31

>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==
ELEVATION DATA: UPSTREAM(FEET) = 139.79 DOWNSTREAM(FEET) = 139.10
FLOW LENGTH(FEET) = 228.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 20.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.60
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 14.58
PIPE TRAVEL TIME(MIN.) = 0.83 Tc(MIN.) = 10.45
LONGEST FLOWPATH FROM NODE 31.00 TO NODE 41.00 = 1313.00 FEET.

****
FLOW PROCESS FROM NODE 41.00 TO NODE 41.00 IS CODE = 1

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 10.45
RAINFALL INTENSITY(INCH/HR) = 2.66
AREA-AVERAGED Fm(INCH/HR) = 0.11
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.27
EFFECTIVE STREAM AREA(ACRES) = 5.69
TOTAL STREAM AREA(ACRES) = 7.41
PEAK FLOW RATE(CFS) AT CONFLUENCE = 14.58

****
FLOW PROCESS FROM NODE 40.10 TO NODE 41.00 IS CODE = 21

>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<

>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==
INITIAL SUBAREA FLOW-LENGTH(FEET) = 300.00
ELEVATION DATA: UPSTREAM(FEET) = 148.80 DOWNSTREAM(FEET) = 147.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 8.826
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.931
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
APARTMENTS	A	2.08	0.40	0.200	32	8.83

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
SUBAREA RUNOFF(CFS) = 5.34
TOTAL AREA(ACRES) = 2.08 PEAK FLOW RATE(CFS) = 5.34

****
FLOW PROCESS FROM NODE 41.00 TO NODE 41.00 IS CODE = 1

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 8.83
RAINFALL INTENSITY(INCH/HR) = 2.93
AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.20
EFFECTIVE STREAM AREA(ACRES) = 2.08
TOTAL STREAM AREA(ACRES) = 2.08
PEAK FLOW RATE(CFS) AT CONFLUENCE = 5.34

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	14.36	8.81	2.935	0.40(0.10)	0.26	5.0	39.10
1	14.44	9.02	2.895	0.40(0.10)	0.26	5.1	37.10
1	14.52	9.52	2.806	0.40(0.11)	0.26	5.3	35.10
1	14.52	9.53	2.805	0.40(0.11)	0.26	5.3	36.10
1	14.58	10.45	2.660	0.40(0.11)	0.27	5.7	38.10
1	13.45	17.61	1.973	0.40(0.12)	0.30	7.4	31.00
2	5.34	8.83	2.931	0.40(0.08)	0.20	2.1	40.10

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	19.69	8.81	2.935	0.40(0.10)	0.24	7.1	39.10
2	19.70	8.83	2.931	0.40(0.10)	0.24	7.1	40.10
3	19.71	9.02	2.895	0.40(0.10)	0.24	7.2	37.10
4	19.62	9.52	2.806	0.40(0.10)	0.25	7.4	35.10
5	19.62	9.53	2.805	0.40(0.10)	0.25	7.4	36.10

```
   6      19.41   10.45    2.660  0.40( 0.10) 0.25        7.8       38.10
   7      16.99   17.61    1.973  0.40( 0.11) 0.28        9.5       31.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      19.71    Tc(MIN.) =      9.02
 EFFECTIVE AREA(ACRES) =       7.20   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.24
 TOTAL AREA(ACRES) =         9.5
 LONGEST FLOWPATH FROM NODE      31.00 TO NODE      41.00 =    1313.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      41.00 TO NODE      42.00 IS CODE =  31
----------------------------------------------------------------------------

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   139.10  DOWNSTREAM(FEET) =   139.07
 FLOW LENGTH(FEET) =      7.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  19.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.73
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     19.71
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =     9.04
 LONGEST FLOWPATH FROM NODE      31.00 TO NODE      42.00 =    1320.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      42.00 TO NODE      42.00 IS CODE =   1
----------------------------------------------------------------------------

 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =     9.04
 RAINFALL INTENSITY(INCH/HR) =   2.89
 AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.40
 AREA-AVERAGED Ap =  0.24
 EFFECTIVE STREAM AREA(ACRES) =       7.20
 TOTAL STREAM AREA(ACRES) =        9.49
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       19.71

****************************************************************************
 FLOW PROCESS FROM NODE      41.10 TO NODE      41.20 IS CODE =  21
----------------------------------------------------------------------------

 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    264.00
 ELEVATION DATA: UPSTREAM(FEET) =     150.70  DOWNSTREAM(FEET) =    150.10

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =     9.554
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.801
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/        SCS SOIL   AREA       Fp         Ap      SCS    Tc
      LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN   (MIN.)
 COMMERCIAL                   A        0.59       0.40      0.100    32     9.55
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =        1.47
 TOTAL AREA(ACRES) =        0.59   PEAK FLOW RATE(CFS) =        1.47

****************************************************************************
 FLOW PROCESS FROM NODE      41.20 TO NODE      41.30 IS CODE =  31
----------------------------------------------------------------------------

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   148.60  DOWNSTREAM(FEET) =   145.34
 FLOW LENGTH(FEET) =    647.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.16
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.47
 PIPE TRAVEL TIME(MIN.) =   3.41    Tc(MIN.) =    12.97
 LONGEST FLOWPATH FROM NODE      41.10 TO NODE      41.30 =     911.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      41.30 TO NODE      41.30 IS CODE =  81
----------------------------------------------------------------------------

 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    12.97
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.351
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/        SCS SOIL   AREA       Fp         Ap      SCS
      LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                   A        0.63       0.40      0.100    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.63      SUBAREA RUNOFF(CFS) =      1.31
 EFFECTIVE AREA(ACRES) =       1.22   AREA-AVERAGED Fm(INCH/HR) =  0.04
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =         1.2       PEAK FLOW RATE(CFS) =        2.54

****************************************************************************
 FLOW PROCESS FROM NODE      41.30 TO NODE      41.40 IS CODE =  31
----------------------------------------------------------------------------

 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   145.34  DOWNSTREAM(FEET) =   142.67
 FLOW LENGTH(FEET) =    190.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.32
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.54
 PIPE TRAVEL TIME(MIN.) =   0.60    Tc(MIN.) =    13.56
 LONGEST FLOWPATH FROM NODE      41.10 TO NODE      41.40 =    1101.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     41.40 TO NODE     41.40 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.56
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.291
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  A        0.24       0.40      0.100     32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.24     SUBAREA RUNOFF(CFS) =      0.49
  EFFECTIVE AREA(ACRES) =       1.46   AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =          1.5       PEAK FLOW RATE(CFS) =        2.96

****************************************************************************
  FLOW PROCESS FROM NODE     41.40 TO NODE     42.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   142.67  DOWNSTREAM(FEET) =   139.07
  FLOW LENGTH(FEET) =     82.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.36
  ESTIMATED PIPE DIAMETER(INCH) =  18.00     NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =        2.96
  PIPE TRAVEL TIME(MIN.) =   0.16     Tc(MIN.) =    13.73
  LONGEST FLOWPATH FROM NODE      41.10 TO NODE      42.00 =     1183.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     42.00 TO NODE     42.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    13.73
  RAINFALL INTENSITY(INCH/HR) =    2.28
  AREA-AVERAGED Fm(INCH/HR) =  0.04
  AREA-AVERAGED Fp(INCH/HR) =  0.40
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =        1.46
  TOTAL STREAM AREA(ACRES) =        1.46
  PEAK FLOW RATE(CFS) AT CONFLUENCE =        2.96

  ** CONFLUENCE DATA **
   STREAM        Q       Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER      (CFS)   (MIN.)  (INCH/HR)  (INCH/HR)          (ACRES)     NODE
      1        19.69     8.83     2.931  0.40( 0.10) 0.24        7.1        39.10
      1        19.70     8.85     2.927  0.40( 0.10) 0.24        7.1        40.10
      1        19.71     9.04     2.891  0.40( 0.10) 0.24        7.2        37.10
      1        19.62     9.54     2.803  0.40( 0.10) 0.25        7.4        35.10
      1        19.62     9.55     2.801  0.40( 0.10) 0.25        7.4        36.10
      1        19.41    10.47     2.657  0.40( 0.10) 0.25        7.8        38.10
      1        16.99    17.63     1.972  0.40( 0.11) 0.28        9.5        31.00
      2         2.96    13.73     2.276  0.40( 0.04) 0.10        1.5        41.10

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

  ** PEAK FLOW RATE TABLE **
   STREAM        Q       Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER      (CFS)   (MIN.)  (INCH/HR)  (INCH/HR)          (ACRES)     NODE
      1        22.15     8.83     2.931  0.40( 0.09) 0.23        8.0        39.10
      2        22.16     8.85     2.927  0.40( 0.09) 0.23        8.0        40.10
      3        22.19     9.04     2.891  0.40( 0.09) 0.23        8.2        37.10
      4        22.16     9.54     2.803  0.40( 0.09) 0.23        8.4        35.10
      5        22.16     9.55     2.801  0.40( 0.09) 0.23        8.4        36.10
      6        22.05    10.47     2.657  0.40( 0.09) 0.23        8.9        38.10
      7        21.27    13.73     2.276  0.40( 0.10) 0.24       10.0        41.10
      8        19.55    17.63     1.972  0.40( 0.10) 0.26       11.0        31.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      22.19    Tc(MIN.) =      9.04
  EFFECTIVE AREA(ACRES) =        8.16   AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.23
  TOTAL AREA(ACRES) =         11.0
  LONGEST FLOWPATH FROM NODE      31.00 TO NODE      42.00 =     1320.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     42.00 TO NODE     43.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   139.07  DOWNSTREAM(FEET) =   138.55
  FLOW LENGTH(FEET) =    105.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.21
  ESTIMATED PIPE DIAMETER(INCH) =  30.00     NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       22.19
  PIPE TRAVEL TIME(MIN.) =   0.28     Tc(MIN.) =     9.32
  LONGEST FLOWPATH FROM NODE      31.00 TO NODE      43.00 =     1425.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     43.00 TO NODE     43.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =     9.32
  RAINFALL INTENSITY(INCH/HR) =    2.84
  AREA-AVERAGED Fm(INCH/HR) =  0.09
  AREA-AVERAGED Fp(INCH/HR) =  0.40
  AREA-AVERAGED Ap =  0.23
```

```
 EFFECTIVE STREAM AREA(ACRES) =        8.16
 TOTAL STREAM AREA(ACRES) =       10.95
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       22.19

****************************************************************************
 FLOW PROCESS FROM NODE      42.10 TO NODE      39.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    271.00
 ELEVATION DATA: UPSTREAM(FEET) =    151.75  DOWNSTREAM(FEET) =    148.70

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.011
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.345
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN  (MIN.)
 COMMERCIAL                  A        0.27       0.40      0.100    32    7.01
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =       0.80
 TOTAL AREA(ACRES) =       0.27   PEAK FLOW RATE(CFS) =       0.80

****************************************************************************
 FLOW PROCESS FROM NODE      39.00 TO NODE      43.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  148.70  DOWNSTREAM ELEVATION(FEET) =  146.25
 STREET LENGTH(FEET) =    356.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 21.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  16.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.23
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.28
   HALFSTREET FLOOD WIDTH(FEET) =     7.91
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.65
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =     0.47
 STREET FLOW TRAVEL TIME(MIN.) =     3.60   Tc(MIN.) =    10.61
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.638
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
 COMMERCIAL                  A        0.36       0.40      0.100    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.36     SUBAREA RUNOFF(CFS) =      0.84
 EFFECTIVE AREA(ACRES) =       0.63    AREA-AVERAGED Fm(INCH/HR) =  0.04
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =         0.6        PEAK FLOW RATE(CFS) =        1.47

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =    8.59
 FLOW VELOCITY(FEET/SEC.) =  1.72   DEPTH*VELOCITY(FT*FT/SEC.) =   0.51
 LONGEST FLOWPATH FROM NODE      42.10 TO NODE      43.00 =     627.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      43.00 TO NODE      43.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    10.61
 RAINFALL INTENSITY(INCH/HR) =    2.64
 AREA-AVERAGED Fm(INCH/HR) =  0.04
 AREA-AVERAGED Fp(INCH/HR) =  0.40
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =        0.63
 TOTAL STREAM AREA(ACRES) =        0.63
 PEAK FLOW RATE(CFS) AT CONFLUENCE =        1.47

 ** CONFLUENCE DATA **
  STREAM        Q       Tc    Intensity    Fp(Fm)      Ap       Ae     HEADWATER
  NUMBER      (CFS)   (MIN.) (INCH/HR)  (INCH/HR)             (ACRES)    NODE
     1        22.15     9.11     2.879  0.40( 0.09) 0.23         8.0       39.10
     1        22.16     9.13     2.875  0.40( 0.09) 0.23         8.0       40.10
     1        22.19     9.32     2.841  0.40( 0.09) 0.23         8.2       37.10
     1        22.16     9.83     2.757  0.40( 0.09) 0.23         8.4       35.10
     1        22.16     9.84     2.755  0.40( 0.09) 0.23         8.4       36.10
     1        22.05    10.76     2.617  0.40( 0.09) 0.23         8.9       38.10
     1        21.27    14.01     2.249  0.40( 0.10) 0.24        10.0       41.10
     1        19.55    17.93     1.953  0.40( 0.10) 0.26        11.0       31.00
     2         1.47    10.61     2.638  0.40( 0.04) 0.10         0.6       42.10

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

 ** PEAK FLOW RATE TABLE **
  STREAM        Q       Tc    Intensity    Fp(Fm)      Ap       Ae     HEADWATER
  NUMBER      (CFS)   (MIN.) (INCH/HR)  (INCH/HR)             (ACRES)    NODE
     1        23.53     9.11     2.879  0.40( 0.09) 0.22         8.6       39.10
     2        23.55     9.13     2.875  0.40( 0.09) 0.22         8.6       40.10
     3        23.59     9.32     2.841  0.40( 0.09) 0.22         8.7       37.10
     4        23.59     9.83     2.757  0.40( 0.09) 0.22         9.0       35.10
     5        23.59     9.84     2.755  0.40( 0.09) 0.22         9.0       36.10
     6        23.54    10.61     2.638  0.40( 0.09) 0.22         9.4       42.10
     7        23.51    10.76     2.617  0.40( 0.09) 0.22         9.5       38.10
     8        22.52    14.01     2.249  0.40( 0.09) 0.23        10.6       41.10
```

```
    9      20.63   17.93    1.953  0.40( 0.10) 0.25      11.6      31.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       23.59     Tc(MIN.) =      9.83
 EFFECTIVE AREA(ACRES) =          9.01   AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.22
 TOTAL AREA(ACRES) =         11.6
 LONGEST FLOWPATH FROM NODE      31.00 TO NODE      43.00 =     1425.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      43.00 TO NODE      44.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   138.55  DOWNSTREAM(FEET) =   138.35
 FLOW LENGTH(FEET) =     40.00    MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =    6.30
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =    1
 PIPE-FLOW(CFS) =       23.59
 PIPE TRAVEL TIME(MIN.) =    0.11     Tc(MIN.) =      9.93
 LONGEST FLOWPATH FROM NODE      31.00 TO NODE      44.00 =     1465.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      44.00 TO NODE      44.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =      9.93
 RAINFALL INTENSITY(INCH/HR) =    2.74
 AREA-AVERAGED Fm(INCH/HR) =  0.09
 AREA-AVERAGED Fp(INCH/HR) =  0.40
 AREA-AVERAGED Ap =  0.22
 EFFECTIVE STREAM AREA(ACRES) =         9.01
 TOTAL STREAM AREA(ACRES) =        11.58
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       23.59

****************************************************************************
 FLOW PROCESS FROM NODE      43.10 TO NODE      40.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    265.00
 ELEVATION DATA: UPSTREAM(FEET) =    150.73  DOWNSTREAM(FEET) =    148.33

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =     7.257
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =   3.279
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap      SCS    Tc
      LAND USE              GROUP   (ACRES)   (INCH/HR)  (DECIMAL)  CN   (MIN.)
 COMMERCIAL                  A        0.22       0.40      0.100     32    7.26
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =       0.64
 TOTAL AREA(ACRES) =        0.22   PEAK FLOW RATE(CFS) =        0.64

****************************************************************************
 FLOW PROCESS FROM NODE      40.00 TO NODE      44.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  148.33  DOWNSTREAM ELEVATION(FEET) =  146.08
 STREET LENGTH(FEET) =    364.00    CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 21.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  16.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =        0.98
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.27
   HALFSTREET FLOOD WIDTH(FEET) =      7.28
   AVERAGE FLOW VELOCITY(FEET/SEC.) =     1.51
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =     0.41
 STREET FLOW TRAVEL TIME(MIN.) =    4.01    Tc(MIN.) =     11.27
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.549
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap      SCS
      LAND USE              GROUP   (ACRES)   (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  A        0.30       0.40      0.100     32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.30      SUBAREA RUNOFF(CFS) =     0.68
 EFFECTIVE AREA(ACRES) =         0.52    AREA-AVERAGED Fm(INCH/HR) =  0.04
 AREA-AVERAGED Fp(INCH/HR) =  0.40   AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =          0.5         PEAK FLOW RATE(CFS) =        1.17

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.28   HALFSTREET FLOOD WIDTH(FEET) =     7.91
 FLOW VELOCITY(FEET/SEC.) =  1.58   DEPTH*VELOCITY(FT*FT/SEC.) =   0.45
 LONGEST FLOWPATH FROM NODE      43.10 TO NODE      44.00 =      629.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      44.00 TO NODE      44.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =     11.27
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.549
 SUBAREA LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS
    LAND USE               GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
APARTMENTS                   A       1.46      0.40      0.200    32
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
SUBAREA AREA(ACRES) =    1.46     SUBAREA RUNOFF(CFS) =     3.24
EFFECTIVE AREA(ACRES) =       1.98   AREA-AVERAGED Fm(INCH/HR) =  0.07
AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.17
TOTAL AREA(ACRES) =          2.0      PEAK FLOW RATE(CFS) =       4.42

****************************************************************************
FLOW PROCESS FROM NODE      44.00 TO NODE     44.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =   11.27
RAINFALL INTENSITY(INCH/HR) =   2.55
AREA-AVERAGED Fm(INCH/HR) =  0.07
AREA-AVERAGED Fp(INCH/HR) =  0.40
AREA-AVERAGED Ap =  0.17
EFFECTIVE STREAM AREA(ACRES) =        1.98
TOTAL STREAM AREA(ACRES) =        1.98
PEAK FLOW RATE(CFS) AT CONFLUENCE =        4.42
```

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	23.53	9.21	2.860	0.40(0.09)	0.22	8.6	39.10
1	23.55	9.23	2.856	0.40(0.09)	0.22	8.6	40.10
1	23.59	9.43	2.823	0.40(0.09)	0.22	8.7	37.10
1	23.59	9.93	2.740	0.40(0.09)	0.22	9.0	35.10
1	23.59	9.94	2.738	0.40(0.09)	0.22	9.0	36.10
1	23.54	10.71	2.623	0.40(0.09)	0.22	9.4	42.10
1	23.51	10.86	2.603	0.40(0.09)	0.22	9.5	38.10
1	22.52	14.12	2.239	0.40(0.09)	0.23	10.6	41.10
1	20.63	18.04	1.946	0.40(0.10)	0.25	11.6	31.00
2	4.42	11.27	2.549	0.40(0.07)	0.17	2.0	43.10

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	27.60	9.21	2.860	0.40(0.08)	0.21	10.2	39.10
2	27.62	9.23	2.856	0.40(0.08)	0.21	10.2	40.10
3	27.69	9.43	2.823	0.40(0.08)	0.21	10.4	37.10
4	27.79	9.93	2.740	0.40(0.09)	0.21	10.8	35.10
5	27.79	9.94	2.738	0.40(0.09)	0.21	10.8	36.10
6	27.87	10.71	2.623	0.40(0.09)	0.21	11.3	42.10
7	27.86	10.86	2.603	0.40(0.09)	0.21	11.4	38.10
8	27.81	11.27	2.549	0.40(0.09)	0.21	11.6	43.10
9	26.39	14.12	2.239	0.40(0.09)	0.22	12.6	41.10
10	23.98	18.04	1.946	0.40(0.09)	0.24	13.6	31.00

```
COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =       27.87    Tc(MIN.) =     10.71
EFFECTIVE AREA(ACRES) =       11.33   AREA-AVERAGED Fm(INCH/HR) =  0.09
AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.21
TOTAL AREA(ACRES) =         13.6
LONGEST FLOWPATH FROM NODE      31.00 TO NODE      44.00 =     1465.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE      61.00 TO NODE     62.00 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
ELEVATION DATA: UPSTREAM(FEET) =     155.00  DOWNSTREAM(FEET) =    152.70

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =     8.404
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =   3.015
SUBAREA Tc AND LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
    LAND USE               GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
APARTMENTS                   A       1.26      0.40      0.200    32    8.40
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
SUBAREA RUNOFF(CFS) =       3.33
TOTAL AREA(ACRES) =         1.26   PEAK FLOW RATE(CFS) =        3.33

****************************************************************************
FLOW PROCESS FROM NODE      62.00 TO NODE     63.00 IS CODE =  61
----------------------------------------------------------------------------
>>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
UPSTREAM ELEVATION(FEET) =  152.70  DOWNSTREAM ELEVATION(FEET) =  151.40
STREET LENGTH(FEET) =    210.00   CURB HEIGHT(INCHES) =  6.0
STREET HALFWIDTH(FEET) = 21.00

DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  16.00
INSIDE STREET CROSSFALL(DECIMAL) =  0.020
OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

  **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =        5.83
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.44
  HALFSTREET FLOOD WIDTH(FEET) =    15.59
  AVERAGE FLOW VELOCITY(FEET/SEC.) =     2.29
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =     1.00
STREET FLOW TRAVEL TIME(MIN.) =    1.53    Tc(MIN.) =     9.93
```

```
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 2.739
 SUBAREA LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap       SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN
 APARTMENTS                 A       2.09      0.40      0.200     32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
 SUBAREA AREA(ACRES) =     2.09     SUBAREA RUNOFF(CFS) =     5.00
 EFFECTIVE AREA(ACRES) =       3.35    AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =          3.3       PEAK FLOW RATE(CFS) =       8.02

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.48   HALFSTREET FLOOD WIDTH(FEET) = 17.72
 FLOW VELOCITY(FEET/SEC.) =  2.46   DEPTH*VELOCITY(FT*FT/SEC.) =  1.18
 LONGEST FLOWPATH FROM NODE     61.00 TO NODE     63.00 =    510.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     63.00 TO NODE     63.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =     9.93
 RAINFALL INTENSITY(INCH/HR) =    2.74
 AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.40
 AREA-AVERAGED Ap =  0.20
 EFFECTIVE STREAM AREA(ACRES) =        3.35
 TOTAL STREAM AREA(ACRES) =        3.35
 PEAK FLOW RATE(CFS) AT CONFLUENCE =        8.02

****************************************************************************
 FLOW PROCESS FROM NODE     62.10 TO NODE     63.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    246.00
 ELEVATION DATA: UPSTREAM(FEET) =    153.90  DOWNSTREAM(FEET) =    151.41

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.343
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.257
 SUBAREA Tc AND LOSS RATE DATA(AMC II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap       SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN  (MIN.)
 APARTMENTS                 A       1.35      0.40      0.200     32    7.34
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.200
 SUBAREA RUNOFF(CFS) =       3.86
 TOTAL AREA(ACRES) =       1.35   PEAK FLOW RATE(CFS) =       3.86

****************************************************************************
 FLOW PROCESS FROM NODE     63.00 TO NODE     63.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =     7.34
 RAINFALL INTENSITY(INCH/HR) =    3.26
 AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.40
 AREA-AVERAGED Ap =  0.20
 EFFECTIVE STREAM AREA(ACRES) =        1.35
 TOTAL STREAM AREA(ACRES) =        1.35
 PEAK FLOW RATE(CFS) AT CONFLUENCE =        3.86

 ** CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)          (ACRES)    NODE
     1        8.02    9.93     2.739   0.40( 0.08) 0.20       3.3       61.00
     2        3.86    7.34     3.257   0.40( 0.08) 0.20       1.4       62.10

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)          (ACRES)    NODE
     1       10.94    7.34     3.257   0.40( 0.08) 0.20       3.8       62.10
     2       11.25    9.93     2.739   0.40( 0.08) 0.20       4.7       61.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      11.25    Tc(MIN.) =      9.93
 EFFECTIVE AREA(ACRES) =       4.70   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        4.7
 LONGEST FLOWPATH FROM NODE     61.00 TO NODE     63.00 =    510.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     63.00 TO NODE     64.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    147.30  DOWNSTREAM(FEET) =    146.70
 FLOW LENGTH(FEET) =    305.00   MANNING'S N = 0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.69
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      11.25
 PIPE TRAVEL TIME(MIN.) =   1.38    Tc(MIN.) =    11.31
 LONGEST FLOWPATH FROM NODE     61.00 TO NODE     64.00 =    815.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     64.00 TO NODE     64.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
==========================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   11.31
 RAINFALL INTENSITY(INCH/HR) =   2.54
 AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.40
 AREA-AVERAGED Ap =  0.20
 EFFECTIVE STREAM AREA(ACRES) =        4.70
 TOTAL STREAM AREA(ACRES) =        4.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       11.25

****************************************************************************
 FLOW PROCESS FROM NODE     63.10 TO NODE     64.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   130.00
 ELEVATION DATA: UPSTREAM(FEET) =    152.17  DOWNSTREAM(FEET) =    151.43

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.990
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.660
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                  A        0.15      0.40      0.100     32    5.99
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      0.49
 TOTAL AREA(ACRES) =       0.15   PEAK FLOW RATE(CFS) =        0.49

****************************************************************************
 FLOW PROCESS FROM NODE     64.00 TO NODE     64.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =     5.99
 RAINFALL INTENSITY(INCH/HR) =   3.66
 AREA-AVERAGED Fm(INCH/HR) =  0.04
 AREA-AVERAGED Fp(INCH/HR) =  0.40
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =        0.15
 TOTAL STREAM AREA(ACRES) =        0.15
 PEAK FLOW RATE(CFS) AT CONFLUENCE =        0.49

 ** CONFLUENCE DATA **
  STREAM        Q       Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1        10.94    8.73     2.950  0.40( 0.08) 0.20       3.8       62.10
     1        11.25   11.31     2.543  0.40( 0.08) 0.20       4.7       61.00
     2         0.49    5.99     3.660  0.40( 0.04) 0.10       0.2       63.10

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

 ** PEAK FLOW RATE TABLE **
  STREAM        Q       Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1         9.86    5.99     3.660  0.40( 0.08) 0.19       2.8       63.10
     2        11.33    8.73     2.950  0.40( 0.08) 0.20       4.0       62.10
     3        11.59   11.31     2.543  0.40( 0.08) 0.20       4.8       61.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       11.59    Tc(MIN.) =     11.31
 EFFECTIVE AREA(ACRES) =        4.85   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        4.8
 LONGEST FLOWPATH FROM NODE      61.00 TO NODE      64.00 =      815.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     64.00 TO NODE     65.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    146.70  DOWNSTREAM(FEET) =    146.65
 FLOW LENGTH(FEET) =     17.00    MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =    4.22
 ESTIMATED PIPE DIAMETER(INCH) =  24.00     NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       11.59
 PIPE TRAVEL TIME(MIN.) =    0.07     Tc(MIN.) =    11.38
 LONGEST FLOWPATH FROM NODE      61.00 TO NODE      65.00 =      832.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     65.00 TO NODE     65.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   11.38
 RAINFALL INTENSITY(INCH/HR) =   2.53
 AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.40
 AREA-AVERAGED Ap =  0.20
 EFFECTIVE STREAM AREA(ACRES) =        4.85
 TOTAL STREAM AREA(ACRES) =        4.85
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       11.59

****************************************************************************
 FLOW PROCESS FROM NODE     64.10 TO NODE     65.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   279.00
```

```
 ELEVATION DATA: UPSTREAM(FEET) =    153.50  DOWNSTREAM(FEET) =    151.43

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.217
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.054
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
     LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 APARTMENTS                  A        0.78      0.40      0.200    32    8.22
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA RUNOFF(CFS) =       2.09
 TOTAL AREA(ACRES) =       0.78   PEAK FLOW RATE(CFS) =        2.09

****************************************************************************
 FLOW PROCESS FROM NODE      65.00 TO NODE      65.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =     8.22
 RAINFALL INTENSITY(INCH/HR) =    3.05
 AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.40
 AREA-AVERAGED Ap =  0.20
 EFFECTIVE STREAM AREA(ACRES) =        0.78
 TOTAL STREAM AREA(ACRES) =        0.78
 PEAK FLOW RATE(CFS) AT CONFLUENCE =        2.09

 ** CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR)  (INCH/HR)           (ACRES)     NODE
     1        9.86    6.06     3.637  0.40( 0.08) 0.19       2.8       63.10
     1       11.33    8.79     2.937  0.40( 0.08) 0.20       4.0       62.10
     1       11.59   11.38     2.534  0.40( 0.08) 0.20       4.8       61.00
     2        2.09    8.22     3.054  0.40( 0.08) 0.20       0.8       64.10

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR)  (INCH/HR)           (ACRES)     NODE
     1       11.70    6.06     3.637  0.40( 0.08) 0.20       3.4       63.10
     2       13.11    8.22     3.054  0.40( 0.08) 0.20       4.5       64.10
     3       13.34    8.79     2.937  0.40( 0.08) 0.20       4.8       62.10
     4       13.31   11.38     2.534  0.40( 0.08) 0.20       5.6       61.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       13.34     Tc(MIN.) =       8.79
 EFFECTIVE AREA(ACRES) =        4.76   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.40   AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =          5.6
 LONGEST FLOWPATH FROM NODE       61.00 TO NODE      65.00 =      832.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      65.00 TO NODE      66.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    146.65  DOWNSTREAM(FEET) =    146.36
 FLOW LENGTH(FEET) =     89.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.68
 ESTIMATED PIPE DIAMETER(INCH) =  27.00     NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       13.34
 PIPE TRAVEL TIME(MIN.) =   0.32     Tc(MIN.) =     9.11
 LONGEST FLOWPATH FROM NODE       61.00 TO NODE      66.00 =      921.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      66.00 TO NODE      66.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =     9.11
 RAINFALL INTENSITY(INCH/HR) =    2.88
 AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.40
 AREA-AVERAGED Ap =  0.20
 EFFECTIVE STREAM AREA(ACRES) =        4.76
 TOTAL STREAM AREA(ACRES) =        5.63
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       13.34

****************************************************************************
 FLOW PROCESS FROM NODE      65.10 TO NODE      66.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    163.00
 ELEVATION DATA: UPSTREAM(FEET) =    154.16  DOWNSTREAM(FEET) =    151.82

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.449
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.864
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap     SCS   Tc
     LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                  A        0.16      0.40      0.100    32    5.45
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =       0.55
 TOTAL AREA(ACRES) =       0.16   PEAK FLOW RATE(CFS) =        0.55

****************************************************************************
 FLOW PROCESS FROM NODE      66.00 TO NODE      66.00 IS CODE =   1
----------------------------------------------------------------------------
```

```
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =     5.45
 RAINFALL INTENSITY(INCH/HR) =   3.86
 AREA-AVERAGED Fm(INCH/HR) =  0.04
 AREA-AVERAGED Fp(INCH/HR) =  0.40
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =        0.16
 TOTAL STREAM AREA(ACRES) =        0.16
 PEAK FLOW RATE(CFS) AT CONFLUENCE =        0.55

 ** CONFLUENCE DATA **
  STREAM       Q       Tc   Intensity  Fp(Fm)      Ap       Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1       11.70    6.39     3.527  0.40( 0.08) 0.20       3.4      63.10
     1       13.11    8.53     2.988  0.40( 0.08) 0.20       4.5      64.10
     1       13.34    9.11     2.878  0.40( 0.08) 0.20       4.8      62.10
     1       13.31   11.70     2.495  0.40( 0.08) 0.20       5.6      61.00
     2        0.55    5.45     3.864  0.40( 0.04) 0.10       0.2      65.10

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q       Tc   Intensity  Fp(Fm)      Ap       Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1       11.50    5.45     3.864  0.40( 0.08) 0.19       3.0      65.10
     2       12.20    6.39     3.527  0.40( 0.08) 0.19       3.5      63.10
     3       13.53    8.53     2.988  0.40( 0.08) 0.19       4.7      64.10
     4       13.75    9.11     2.878  0.40( 0.08) 0.19       4.9      62.10
     5       13.66   11.70     2.495  0.40( 0.08) 0.19       5.8      61.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      13.75    Tc(MIN.) =      9.11
 EFFECTIVE AREA(ACRES) =        4.92   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.19
 TOTAL AREA(ACRES) =          5.8
 LONGEST FLOWPATH FROM NODE      61.00 TO NODE      66.00 =     921.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      66.00 TO NODE      67.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    146.36  DOWNSTREAM(FEET) =    146.32
 FLOW LENGTH(FEET) =     10.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.12
 ESTIMATED PIPE DIAMETER(INCH) =  27.00     NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      13.75
 PIPE TRAVEL TIME(MIN.) =   0.03     Tc(MIN.) =     9.14
 LONGEST FLOWPATH FROM NODE      61.00 TO NODE      67.00 =     931.00 FEET.
```

```
****************************************************************************
 FLOW PROCESS FROM NODE      67.00 TO NODE      67.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =     9.14
 RAINFALL INTENSITY(INCH/HR) =   2.87
 AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.40
 AREA-AVERAGED Ap =  0.19
 EFFECTIVE STREAM AREA(ACRES) =        4.92
 TOTAL STREAM AREA(ACRES) =        5.79
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       13.75

****************************************************************************
 FLOW PROCESS FROM NODE      66.10 TO NODE      67.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    300.00
 ELEVATION DATA: UPSTREAM(FEET) =    154.00  DOWNSTREAM(FEET) =    151.92

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =     8.574
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.980
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)   CN  (MIN.)
 APARTMENTS                  A        0.90      0.40      0.200     32    8.57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA RUNOFF(CFS) =       2.35
 TOTAL AREA(ACRES) =       0.90   PEAK FLOW RATE(CFS) =        2.35

****************************************************************************
 FLOW PROCESS FROM NODE      67.00 TO NODE      67.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =     8.57
 RAINFALL INTENSITY(INCH/HR) =   2.98
 AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.40
 AREA-AVERAGED Ap =  0.20
 EFFECTIVE STREAM AREA(ACRES) =        0.90
 TOTAL STREAM AREA(ACRES) =        0.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =        2.35

 ** CONFLUENCE DATA **
```

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	11.50	5.48	3.850	0.40(0.08)	0.19	3.0	65.10
1	12.20	6.43	3.516	0.40(0.08)	0.19	3.5	63.10
1	13.53	8.57	2.981	0.40(0.08)	0.19	4.7	64.10
1	13.75	9.14	2.872	0.40(0.08)	0.19	4.9	62.10
1	13.66	11.73	2.491	0.40(0.08)	0.19	5.8	61.00
2	2.35	8.57	2.980	0.40(0.08)	0.20	0.9	66.10

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	13.45	5.48	3.850	0.40(0.08)	0.19	3.6	65.10
2	14.28	6.43	3.516	0.40(0.08)	0.19	4.2	63.10
3	15.88	8.57	2.981	0.40(0.08)	0.19	5.6	64.10
4	15.89	8.57	2.980	0.40(0.08)	0.19	5.6	66.10
5	16.01	9.14	2.872	0.40(0.08)	0.19	5.8	62.10
6	15.62	11.73	2.491	0.40(0.08)	0.20	6.7	61.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 16.01 Tc(MIN.) = 9.14
EFFECTIVE AREA(ACRES) = 5.82 AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.19
TOTAL AREA(ACRES) = 6.7
LONGEST FLOWPATH FROM NODE 61.00 TO NODE 67.00 = 931.00 FEET.

****

FLOW PROCESS FROM NODE 67.00 TO NODE 68.00 IS CODE = 31

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

==

ELEVATION DATA: UPSTREAM(FEET) = 146.32 DOWNSTREAM(FEET) = 144.80
FLOW LENGTH(FEET) = 463.00 MANNING'S N = 0.013
DEPTH OF FLOW IN 27.0 INCH PIPE IS 21.0 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) = 4.82
ESTIMATED PIPE DIAMETER(INCH) = 27.00 NUMBER OF PIPES = 1
PIPE-FLOW(CFS) = 16.01
PIPE TRAVEL TIME(MIN.) = 1.60 Tc(MIN.) = 10.75
LONGEST FLOWPATH FROM NODE 61.00 TO NODE 68.00 = 1394.00 FEET.

****

FLOW PROCESS FROM NODE 68.00 TO NODE 68.00 IS CODE = 1

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

==

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 1 ARE:
TIME OF CONCENTRATION(MIN.) = 10.75
RAINFALL INTENSITY(INCH/HR) = 2.62
AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.19
EFFECTIVE STREAM AREA(ACRES) = 5.82
TOTAL STREAM AREA(ACRES) = 6.69
PEAK FLOW RATE(CFS) AT CONFLUENCE = 16.01

****

FLOW PROCESS FROM NODE 67.10 TO NODE 68.00 IS CODE = 21

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

==

INITIAL SUBAREA FLOW-LENGTH(FEET) = 300.00
ELEVATION DATA: UPSTREAM(FEET) = 154.16 DOWNSTREAM(FEET) = 150.50

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) = 7.185
* 10 YEAR RAINFALL INTENSITY(INCH/HR) = 3.298
SUBAREA Tc AND LOSS RATE DATA(AMC II):

DEVELOPMENT TYPE/ LAND USE	SCS SOIL GROUP	AREA (ACRES)	Fp (INCH/HR)	Ap (DECIMAL)	SCS CN	Tc (MIN.)
COMMERCIAL	A	0.27	0.40	0.100	32	7.19

SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) = 0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap = 0.100
SUBAREA RUNOFF(CFS) = 0.79
TOTAL AREA(ACRES) = 0.27 PEAK FLOW RATE(CFS) = 0.79

****

FLOW PROCESS FROM NODE 68.00 TO NODE 68.00 IS CODE = 1

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

==

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 7.19
RAINFALL INTENSITY(INCH/HR) = 3.30
AREA-AVERAGED Fm(INCH/HR) = 0.04
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 0.27
TOTAL STREAM AREA(ACRES) = 0.27
PEAK FLOW RATE(CFS) AT CONFLUENCE = 0.79

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	13.45	7.12	3.314	0.40(0.08)	0.19	3.6	65.10
1	14.28	8.05	3.090	0.40(0.08)	0.19	4.2	63.10
1	15.88	10.17	2.702	0.40(0.08)	0.19	5.6	64.10
1	15.89	10.18	2.702	0.40(0.08)	0.19	5.6	66.10
1	16.01	10.75	2.619	0.40(0.08)	0.19	5.8	62.10
1	15.62	13.33	2.314	0.40(0.08)	0.20	6.7	61.00
2	0.79	7.19	3.298	0.40(0.04)	0.10	0.3	67.10

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

```
** PEAK FLOW RATE TABLE **
 STREAM         Q       Tc    Intensity   Fp(Fm)      Ap       Ae      HEADWATER
 NUMBER       (CFS)   (MIN.) (INCH/HR)  (INCH/HR)            (ACRES)     NODE
    1         14.24    7.12    3.314   0.40( 0.07) 0.19        3.9       65.10
    2         14.30    7.19    3.298   0.40( 0.07) 0.19        3.9       67.10
    3         15.03    8.05    3.090   0.40( 0.07) 0.19        4.5       63.10
    4         16.53   10.17    2.702   0.40( 0.08) 0.19        5.8       64.10
    5         16.53   10.18    2.702   0.40( 0.08) 0.19        5.8       66.10
    6         16.64   10.75    2.619   0.40( 0.08) 0.19        6.1       62.10
    7         16.17   13.33    2.314   0.40( 0.08) 0.19        7.0       61.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =       16.64    Tc(MIN.) =     10.75
EFFECTIVE AREA(ACRES) =        6.09   AREA-AVERAGED Fm(INCH/HR) =  0.08
AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.19
TOTAL AREA(ACRES) =        7.0
LONGEST FLOWPATH FROM NODE      61.00 TO NODE      68.00 =     1394.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      68.00 TO NODE      69.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    144.80  DOWNSTREAM(FEET) =    143.71
 FLOW LENGTH(FEET) =    118.00    MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =    7.31
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      16.64
 PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =    11.02
 LONGEST FLOWPATH FROM NODE      61.00 TO NODE      69.00 =     1512.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      69.00 TO NODE      69.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    11.02
 RAINFALL INTENSITY(INCH/HR) =    2.58
 AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.40
 AREA-AVERAGED Ap =  0.19
 EFFECTIVE STREAM AREA(ACRES) =        6.09
 TOTAL STREAM AREA(ACRES) =        6.96
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       16.64

****************************************************************************
 FLOW PROCESS FROM NODE      68.10 TO NODE      68.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    265.00
 ELEVATION DATA: UPSTREAM(FEET) =    154.10  DOWNSTREAM(FEET) =    151.14

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =     6.959
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.359
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap      SCS   Tc
     LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                  A        0.20      0.40      0.100    32    6.96
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      0.60
 TOTAL AREA(ACRES) =       0.20   PEAK FLOW RATE(CFS) =       0.60

****************************************************************************
 FLOW PROCESS FROM NODE      68.20 TO NODE      69.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  151.14  DOWNSTREAM ELEVATION(FEET) =  148.80
 STREET LENGTH(FEET) =    185.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) =  21.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  16.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.80
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.23
   HALFSTREET FLOOD WIDTH(FEET) =     5.41
   AVERAGE FLOW VELOCITY(FEET/SEC.) =     1.94
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =     0.45
 STREET FLOW TRAVEL TIME(MIN.) =    1.59    Tc(MIN.) =      8.55
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.985
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap      SCS
     LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                  A        0.15      0.40      0.100    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.15     SUBAREA RUNOFF(CFS) =     0.40
 EFFECTIVE AREA(ACRES) =       0.35    AREA-AVERAGED Fm(INCH/HR) =  0.04
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =         0.4        PEAK FLOW RATE(CFS) =        0.93

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.24    HALFSTREET FLOOD WIDTH(FEET) =    5.91
 FLOW VELOCITY(FEET/SEC.) =  1.99   DEPTH*VELOCITY(FT*FT/SEC.) =   0.49
 LONGEST FLOWPATH FROM NODE      68.10 TO NODE      69.00 =     450.00 FEET.
```

```
****************************************************************************
 FLOW PROCESS FROM NODE      69.00 TO NODE      69.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    8.55
 * 10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.985
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp        Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 APARTMENTS                 A        1.99      0.40      0.200    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    1.99      SUBAREA RUNOFF(CFS) =     5.20
 EFFECTIVE AREA(ACRES) =      2.34   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.19
 TOTAL AREA(ACRES) =        2.3       PEAK FLOW RATE(CFS) =       6.13

****************************************************************************
 FLOW PROCESS FROM NODE      69.00 TO NODE      69.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    8.55
 RAINFALL INTENSITY(INCH/HR) =   2.99
 AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.40
 AREA-AVERAGED Ap =  0.19
 EFFECTIVE STREAM AREA(ACRES) =       2.34
 TOTAL STREAM AREA(ACRES) =        2.34
 PEAK FLOW RATE(CFS) AT CONFLUENCE =        6.13

 ** CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap       Ae       HEADWATER
  NUMBER     (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)          (ACRES)      NODE
     1       14.24    7.41     3.240   0.40( 0.07) 0.19       3.9       65.10
     1       14.30    7.47     3.225   0.40( 0.07) 0.19       3.9       67.10
     1       15.03    8.32     3.031   0.40( 0.07) 0.19       4.5       63.10
     1       16.53   10.44     2.662   0.40( 0.08) 0.19       5.8       64.10
     1       16.53   10.45     2.661   0.40( 0.08) 0.19       5.8       66.10
     1       16.64   11.02     2.582   0.40( 0.08) 0.19       6.1       62.10
     1       16.17   13.60     2.288   0.40( 0.08) 0.19       7.0       61.00
     2        6.13    8.55     2.985   0.40( 0.07) 0.19       2.3       68.10

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap       Ae       HEADWATER
  NUMBER     (CFS)  (MIN.)  (INCH/HR)  (INCH/HR)          (ACRES)      NODE
     1       20.02    7.41     3.240   0.40( 0.07) 0.19       5.9       65.10
     2       20.10    7.47     3.225   0.40( 0.07) 0.19       5.9       67.10
     3       21.09    8.32     3.031   0.40( 0.07) 0.19       6.7       63.10
     4       21.32    8.55     2.985   0.40( 0.07) 0.19       6.9       68.10
     5       21.98   10.44     2.662   0.40( 0.08) 0.19       8.2       64.10
     6       21.98   10.45     2.661   0.40( 0.08) 0.19       8.2       66.10
     7       21.92   11.02     2.582   0.40( 0.08) 0.19       8.4       62.10
     8       20.83   13.60     2.288   0.40( 0.08) 0.19       9.3       61.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      21.98    Tc(MIN.) =     10.45
 EFFECTIVE AREA(ACRES) =      8.18   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.19
 TOTAL AREA(ACRES) =        9.3
 LONGEST FLOWPATH FROM NODE      61.00 TO NODE      69.00 =    1512.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      69.00 TO NODE      70.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   143.71  DOWNSTREAM(FEET) =   142.45
 FLOW LENGTH(FEET) =    180.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.99
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     21.98
 PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =    10.88
 LONGEST FLOWPATH FROM NODE      61.00 TO NODE      70.00 =    1692.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      70.00 TO NODE      70.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   10.88
 RAINFALL INTENSITY(INCH/HR) =   2.60
 AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.40
 AREA-AVERAGED Ap =  0.19
 EFFECTIVE STREAM AREA(ACRES) =        8.18
 TOTAL STREAM AREA(ACRES) =         9.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       21.98

****************************************************************************
 FLOW PROCESS FROM NODE      68.00 TO NODE      70.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    300.00
 ELEVATION DATA: UPSTREAM(FEET) =    150.40  DOWNSTREAM(FEET) =    146.65

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.151
```

```
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.307
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap     SCS   Tc
      LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                   A        0.36      0.40     0.100    32    7.15
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      1.06
 TOTAL AREA(ACRES) =      0.36    PEAK FLOW RATE(CFS) =      1.06

****************************************************************************
 FLOW PROCESS FROM NODE     70.00 TO NODE     70.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =     7.15
 RAINFALL INTENSITY(INCH/HR) =   3.31
 AREA-AVERAGED Fm(INCH/HR) =  0.04
 AREA-AVERAGED Fp(INCH/HR) =  0.40
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =         0.36
 TOTAL STREAM AREA(ACRES) =         0.36
 PEAK FLOW RATE(CFS) AT CONFLUENCE =        1.06

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1       20.02    7.85    3.136  0.40( 0.07) 0.19       5.9       65.10
     1       20.10    7.91    3.122  0.40( 0.07) 0.19       5.9       67.10
     1       21.09    8.76    2.945  0.40( 0.07) 0.19       6.7       63.10
     1       21.32    8.98    2.902  0.40( 0.07) 0.19       6.9       68.10
     1       21.98   10.87    2.602  0.40( 0.08) 0.19       8.2       64.10
     1       21.98   10.88    2.601  0.40( 0.08) 0.19       8.2       66.10
     1       21.92   11.44    2.526  0.40( 0.08) 0.19       8.4       62.10
     1       20.83   14.04    2.247  0.40( 0.08) 0.19       9.3       61.00
     2        1.06    7.15    3.307  0.40( 0.04) 0.10       0.4       68.00

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1       20.32    7.15    3.307  0.40( 0.07) 0.18       5.7       68.00
     2       21.02    7.85    3.136  0.40( 0.07) 0.18       6.2       65.10
     3       21.10    7.91    3.122  0.40( 0.07) 0.18       6.3       67.10
     4       22.03    8.76    2.945  0.40( 0.07) 0.18       7.1       63.10
     5       22.24    8.98    2.902  0.40( 0.07) 0.18       7.3       68.10
     6       22.81   10.87    2.602  0.40( 0.07) 0.18       8.5       64.10
     7       22.81   10.88    2.601  0.40( 0.07) 0.18       8.5       66.10
     8       22.72   11.44    2.526  0.40( 0.07) 0.19       8.8       62.10
     9       21.54   14.04    2.247  0.40( 0.07) 0.19       9.7       61.00
```

```
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      22.81    Tc(MIN.) =     10.88
 EFFECTIVE AREA(ACRES) =       8.54   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.18
 TOTAL AREA(ACRES) =       9.7
 LONGEST FLOWPATH FROM NODE      61.00 TO NODE      70.00 =    1692.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     70.00 TO NODE     71.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   142.45  DOWNSTREAM(FEET) =   142.36
 FLOW LENGTH(FEET) =     12.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.24
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      22.81
 PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    10.90
 LONGEST FLOWPATH FROM NODE      61.00 TO NODE      71.00 =    1704.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     71.00 TO NODE     71.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    10.90
 RAINFALL INTENSITY(INCH/HR) =   2.60
 AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.40
 AREA-AVERAGED Ap =  0.18
 EFFECTIVE STREAM AREA(ACRES) =         8.54
 TOTAL STREAM AREA(ACRES) =         9.66
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       22.81

****************************************************************************
 FLOW PROCESS FROM NODE     70.10 TO NODE     71.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    232.00
 ELEVATION DATA: UPSTREAM(FEET) =    149.50  DOWNSTREAM(FEET) =    146.60

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =     6.452
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.508
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap     SCS   Tc
      LAND USE              GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                   A        0.77      0.40     0.100    32    6.45
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
```

```
SUBAREA RUNOFF(CFS) =       2.40
TOTAL AREA(ACRES) =       0.77   PEAK FLOW RATE(CFS) =       2.40

****************************************************************************
 FLOW PROCESS FROM NODE      71.00 TO NODE      71.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =     6.45
 RAINFALL INTENSITY(INCH/HR) =    3.51
 AREA-AVERAGED Fm(INCH/HR) =  0.04
 AREA-AVERAGED Fp(INCH/HR) =  0.40
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =        0.77
 TOTAL STREAM AREA(ACRES) =        0.77
 PEAK FLOW RATE(CFS) AT CONFLUENCE =        2.40

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1       20.32    7.18    3.300  0.40( 0.07) 0.18       5.7      68.00
     1       21.02    7.87    3.129  0.40( 0.07) 0.18       6.2      65.10
     1       21.10    7.94    3.115  0.40( 0.07) 0.18       6.3      67.10
     1       22.03    8.78    2.939  0.40( 0.07) 0.18       7.1      63.10
     1       22.24    9.01    2.897  0.40( 0.07) 0.18       7.3      68.10
     1       22.81   10.90    2.598  0.40( 0.07) 0.18       8.5      64.10
     1       22.81   10.90    2.597  0.40( 0.07) 0.18       8.5      66.10
     1       22.72   11.47    2.522  0.40( 0.07) 0.19       8.8      62.10
     1       21.54   14.06    2.244  0.40( 0.07) 0.19       9.7      61.00
     2        2.40    6.45    3.508  0.40( 0.04) 0.10       0.8      70.10

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1       21.85    6.45    3.508  0.40( 0.07) 0.17       5.9      70.10
     2       22.58    7.18    3.300  0.40( 0.07) 0.17       6.5      68.00
     3       23.16    7.87    3.129  0.40( 0.07) 0.17       7.0      65.10
     4       23.23    7.94    3.115  0.40( 0.07) 0.17       7.1      67.10
     5       24.04    8.78    2.939  0.40( 0.07) 0.17       7.9      63.10
     6       24.22    9.01    2.897  0.40( 0.07) 0.17       8.1      68.10
     7       24.58   10.90    2.598  0.40( 0.07) 0.18       9.3      64.10
     8       24.58   10.90    2.597  0.40( 0.07) 0.18       9.3      66.10
     9       24.44   11.47    2.522  0.40( 0.07) 0.18       9.6      62.10
    10       23.07   14.06    2.244  0.40( 0.07) 0.18      10.4      61.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       24.58   Tc(MIN.) =     10.90
 EFFECTIVE AREA(ACRES) =        9.30   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.40   AREA-AVERAGED Ap =  0.18
 TOTAL AREA(ACRES) =       10.4
```

```
 LONGEST FLOWPATH FROM NODE      61.00 TO NODE      71.00 =    1704.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      71.00 TO NODE      72.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    142.36  DOWNSTREAM(FEET) =    141.50
 FLOW LENGTH(FEET) =     55.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.69
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      24.58
 PIPE TRAVEL TIME(MIN.) =    0.09     Tc(MIN.) =    10.99
 LONGEST FLOWPATH FROM NODE      61.00 TO NODE      72.00 =    1759.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      72.00 TO NODE      72.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    10.99
 RAINFALL INTENSITY(INCH/HR) =    2.58
 AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.40
 AREA-AVERAGED Ap =  0.18
 EFFECTIVE STREAM AREA(ACRES) =        9.30
 TOTAL STREAM AREA(ACRES) =       10.43
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       24.58

****************************************************************************
 FLOW PROCESS FROM NODE      71.10 TO NODE      71.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    275.00
 ELEVATION DATA: UPSTREAM(FEET) =    150.10  DOWNSTREAM(FEET) =    149.80

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.247
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.551
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                  A        0.89      0.40      0.100    32   11.25
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =       2.01
 TOTAL AREA(ACRES) =       0.89   PEAK FLOW RATE(CFS) =       2.01

****************************************************************************
 FLOW PROCESS FROM NODE      71.20 TO NODE      71.30 IS CODE =  51
```

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----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    149.80  DOWNSTREAM(FEET) =    147.60
 CHANNEL LENGTH THRU SUBAREA(FEET) =   993.00   CHANNEL SLOPE =  0.0022
 CHANNEL BASE(FEET) =    10.00   "Z" FACTOR =  10.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =    1.00
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.810
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap       SCS
      LAND USE             GROUP   (ACRES)   (INCH/HR)   (DECIMAL)   CN
 COMMERCIAL                  A        6.14       0.40       0.100     32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =        7.02
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =    1.80
 AVERAGE FLOW DEPTH(FEET) =    0.30   TRAVEL TIME(MIN.) =    9.22
 Tc(MIN.) =    20.46
 SUBAREA AREA(ACRES) =      6.14       SUBAREA RUNOFF(CFS) =     9.78
 EFFECTIVE AREA(ACRES) =       7.03     AREA-AVERAGED Fm(INCH/HR) =    0.04
 AREA-AVERAGED Fp(INCH/HR) =    0.40  AREA-AVERAGED Ap =    0.10
 TOTAL AREA(ACRES) =          7.0          PEAK FLOW RATE(CFS) =       11.20

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =   0.39    FLOW VELOCITY(FEET/SEC.) =    2.09
 LONGEST FLOWPATH FROM NODE       71.10 TO NODE       71.30 =      1268.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE       71.30 TO NODE       72.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    147.60  DOWNSTREAM(FEET) =    141.50
 FLOW LENGTH(FEET) =     97.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS    8.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.76
 ESTIMATED PIPE DIAMETER(INCH) =  18.00      NUMBER OF PIPES =    1
 PIPE-FLOW(CFS) =        11.20
 PIPE TRAVEL TIME(MIN.) =    0.12     Tc(MIN.) =    20.58
 LONGEST FLOWPATH FROM NODE       71.10 TO NODE       72.00 =      1365.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE       72.00 TO NODE       72.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =   2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    20.58
 RAINFALL INTENSITY(INCH/HR) =    1.80
 AREA-AVERAGED Fm(INCH/HR) =   0.04
 AREA-AVERAGED Fp(INCH/HR) =   0.40
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 AREA-AVERAGED Ap =   0.10
 EFFECTIVE STREAM AREA(ACRES) =         7.03
 TOTAL STREAM AREA(ACRES) =        7.03
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       11.20

 ** CONFLUENCE DATA **
  STREAM        Q        Tc    Intensity   Fp(Fm)       Ap      Ae      HEADWATER
  NUMBER      (CFS)    (MIN.)  (INCH/HR)  (INCH/HR)           (ACRES)     NODE
     1        21.85     6.55     3.478   0.40( 0.07) 0.17        5.9       70.10
     1        22.58     7.27     3.275   0.40( 0.07) 0.17        6.5       68.00
     1        23.16     7.97     3.108   0.40( 0.07) 0.17        7.0       65.10
     1        23.23     8.03     3.094   0.40( 0.07) 0.17        7.1       67.10
     1        24.04     8.88     2.921   0.40( 0.07) 0.17        7.9       63.10
     1        24.22     9.10     2.880   0.40( 0.07) 0.17        8.1       68.10
     1        24.58    10.99     2.585   0.40( 0.07) 0.18        9.3       64.10
     1        24.58    11.00     2.584   0.40( 0.07) 0.18        9.3       66.10
     1        24.44    11.57     2.511   0.40( 0.07) 0.18        9.6       62.10
     1        23.07    14.16     2.236   0.40( 0.07) 0.18       10.4       61.00
     2        11.20    20.58     1.805   0.40( 0.04) 0.10        7.0       71.10

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

 ** PEAK FLOW RATE TABLE **
  STREAM        Q        Tc    Intensity   Fp(Fm)       Ap      Ae      HEADWATER
  NUMBER      (CFS)    (MIN.)  (INCH/HR)  (INCH/HR)           (ACRES)     NODE
     1        28.79     6.55     3.478   0.40( 0.06) 0.15        8.2       70.10
     2        29.84     7.27     3.275   0.40( 0.06) 0.15        9.0       68.00
     3        30.71     7.97     3.108   0.40( 0.06) 0.15        9.7       65.10
     4        30.79     8.03     3.094   0.40( 0.06) 0.15        9.8       67.10
     5        31.93     8.88     2.921   0.40( 0.06) 0.15       10.9       63.10
     6        32.20     9.10     2.880   0.40( 0.06) 0.15       11.2       68.10
     7        33.21    10.99     2.585   0.40( 0.06) 0.16       13.1       64.10
     8        33.21    11.00     2.584   0.40( 0.06) 0.16       13.1       66.10
     9        33.26    11.57     2.511   0.40( 0.06) 0.16       13.5       62.10
    10        32.66    14.16     2.236   0.40( 0.06) 0.15       15.3       61.00
    11        29.68    20.58     1.805   0.40( 0.06) 0.15       17.5       71.10

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      33.26    Tc(MIN.) =     11.57
 EFFECTIVE AREA(ACRES) =      13.51    AREA-AVERAGED Fm(INCH/HR) =   0.06
 AREA-AVERAGED Fp(INCH/HR) =   0.40   AREA-AVERAGED Ap =   0.16
 TOTAL AREA(ACRES) =        17.5
 LONGEST FLOWPATH FROM NODE       61.00 TO NODE       72.00 =      1759.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE       72.00 TO NODE       73.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    141.50  DOWNSTREAM(FEET) =    140.82
 FLOW LENGTH(FEET) =    287.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS   28.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =    5.18
 ESTIMATED PIPE DIAMETER(INCH) =  39.00      NUMBER OF PIPES =    1
```

```
PIPE-FLOW(CFS) =      33.26
PIPE TRAVEL TIME(MIN.) =   0.92    Tc(MIN.) =   12.49
LONGEST FLOWPATH FROM NODE      61.00 TO NODE      73.00 =    2046.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE      73.00 TO NODE      73.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MIN.) =   12.49
RAINFALL INTENSITY(INCH/HR) =   2.40
AREA-AVERAGED Fm(INCH/HR) =  0.06
AREA-AVERAGED Fp(INCH/HR) =  0.40
AREA-AVERAGED Ap =  0.16
EFFECTIVE STREAM AREA(ACRES) =      13.51
TOTAL STREAM AREA(ACRES) =      17.46
PEAK FLOW RATE(CFS) AT CONFLUENCE =      33.26

****************************************************************************
FLOW PROCESS FROM NODE      72.10 TO NODE      73.00 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =   274.00
ELEVATION DATA: UPSTREAM(FEET) =    147.21  DOWNSTREAM(FEET) =    146.38

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.156
*  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.870
SUBAREA Tc AND LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap       SCS   Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
COMMERCIAL                  A       0.42      0.40      0.100     32    9.16
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
SUBAREA RUNOFF(CFS) =       1.07
TOTAL AREA(ACRES) =       0.42    PEAK FLOW RATE(CFS) =       1.07

****************************************************************************
FLOW PROCESS FROM NODE      73.00 TO NODE      73.00 IS CODE =   1
----------------------------------------------------------------------------
>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
TIME OF CONCENTRATION(MIN.) =    9.16
RAINFALL INTENSITY(INCH/HR) =   2.87
AREA-AVERAGED Fm(INCH/HR) =  0.04
AREA-AVERAGED Fp(INCH/HR) =  0.40
AREA-AVERAGED Ap =  0.10
EFFECTIVE STREAM AREA(ACRES) =       0.42
TOTAL STREAM AREA(ACRES) =       0.42
PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.07

** CONFLUENCE DATA **
 STREAM       Q       Tc    Intensity   Fp(Fm)      Ap       Ae      HEADWATER
 NUMBER     (CFS)   (MIN.)  (INCH/HR)  (INCH/HR)           (ACRES)     NODE
    1       28.79    7.51     3.214   0.40( 0.06) 0.15        8.2       70.10
    1       29.84    8.24     3.049   0.40( 0.06) 0.15        9.0       68.00
    1       30.71    8.93     2.911   0.40( 0.06) 0.15        9.7       65.10
    1       30.79    8.99     2.900   0.40( 0.06) 0.15        9.8       67.10
    1       31.93    9.81     2.759   0.40( 0.06) 0.15       10.9       63.10
    1       32.20   10.03     2.724   0.40( 0.06) 0.15       11.2       68.10
    1       33.21   11.92     2.468   0.40( 0.06) 0.16       13.1       64.10
    1       33.21   11.92     2.467   0.40( 0.06) 0.16       13.1       66.10
    1       33.26   12.49     2.402   0.40( 0.06) 0.16       13.5       62.10
    1       32.66   15.09     2.156   0.40( 0.06) 0.15       15.3       61.00
    1       29.68   21.54     1.758   0.40( 0.06) 0.15       17.5       71.10
    2        1.07    9.16     2.870   0.40( 0.04) 0.10        0.4       72.10

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

** PEAK FLOW RATE TABLE **
 STREAM       Q       Tc    Intensity   Fp(Fm)      Ap       Ae      HEADWATER
 NUMBER     (CFS)   (MIN.)  (INCH/HR)  (INCH/HR)           (ACRES)     NODE
    1       29.78    7.51     3.214   0.40( 0.06) 0.15        8.5       70.10
    2       30.87    8.24     3.049   0.40( 0.06) 0.15        9.4       68.00
    3       31.77    8.93     2.911   0.40( 0.06) 0.15       10.2       65.10
    4       31.86    8.99     2.900   0.40( 0.06) 0.15       10.2       67.10
    5       32.09    9.16     2.870   0.40( 0.06) 0.15       10.5       72.10
    6       32.96    9.81     2.759   0.40( 0.06) 0.15       11.3       63.10
    7       33.21   10.03     2.724   0.40( 0.06) 0.15       11.6       68.10
    8       34.13   11.92     2.468   0.40( 0.06) 0.15       13.5       64.10
    9       34.13   11.92     2.467   0.40( 0.06) 0.15       13.5       66.10
   10       34.15   12.49     2.402   0.40( 0.06) 0.15       13.9       62.10
   11       33.46   15.09     2.156   0.40( 0.06) 0.15       15.7       61.00
   12       30.33   21.54     1.758   0.40( 0.06) 0.15       17.9       71.10

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =      34.15    Tc(MIN.) =     12.49
EFFECTIVE AREA(ACRES) =       13.93   AREA-AVERAGED Fm(INCH/HR) =  0.06
AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.15
TOTAL AREA(ACRES) =       17.9
LONGEST FLOWPATH FROM NODE      61.00 TO NODE      73.00 =    2046.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE      73.00 TO NODE      95.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =    140.82  DOWNSTREAM(FEET) =    137.00
FLOW LENGTH(FEET) =    115.00    MANNING'S N =  0.013
DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.4 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  14.03
ESTIMATED PIPE DIAMETER(INCH) =  24.00     NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      34.15
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 PIPE TRAVEL TIME(MIN.) =    0.14    Tc(MIN.) =    12.63
 LONGEST FLOWPATH FROM NODE      61.00 TO NODE      95.00 =     2161.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      95.00 TO NODE      95.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS = 2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   12.63
 RAINFALL INTENSITY(INCH/HR) =   2.39
 AREA-AVERAGED Fm(INCH/HR) =  0.06
 AREA-AVERAGED Fp(INCH/HR) =  0.40
 AREA-AVERAGED Ap =  0.15
 EFFECTIVE STREAM AREA(ACRES) =      13.93
 TOTAL STREAM AREA(ACRES) =      17.88
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       34.15

****************************************************************************
 FLOW PROCESS FROM NODE      91.00 TO NODE      92.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    300.00
 ELEVATION DATA: UPSTREAM(FEET) =     154.00  DOWNSTREAM(FEET) =     151.50

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =     8.265
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.044
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap       SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)   (DECIMAL)   CN   (MIN.)
 APARTMENTS                   A        1.27       0.40      0.200     32     8.26
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA RUNOFF(CFS) =       3.39
 TOTAL AREA(ACRES) =         1.27   PEAK FLOW RATE(CFS) =        3.39

****************************************************************************
 FLOW PROCESS FROM NODE      92.00 TO NODE      93.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     151.50  DOWNSTREAM(FEET) =     149.10
 CHANNEL LENGTH THRU SUBAREA(FEET) =    256.00   CHANNEL SLOPE =  0.0094
 CHANNEL BASE(FEET) =    10.00    "Z" FACTOR =  10.000
 MANNING'S FACTOR = 0.015    MAXIMUM DEPTH(FEET) =     1.00
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.766
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap       SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)   (DECIMAL)   CN
 APARTMENTS                   A        2.19       0.40      0.200     32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =        6.03
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =    2.84
 AVERAGE FLOW DEPTH(FEET) =    0.18   TRAVEL TIME(MIN.) =    1.50
 Tc(MIN.) =     9.77
 SUBAREA AREA(ACRES) =       2.19      SUBAREA RUNOFF(CFS) =      5.29
 EFFECTIVE AREA(ACRES) =        3.46     AREA-AVERAGED Fm(INCH/HR) =    0.08
 AREA-AVERAGED Fp(INCH/HR) =    0.40  AREA-AVERAGED Ap =    0.20
 TOTAL AREA(ACRES) =          3.5          PEAK FLOW RATE(CFS) =         8.36

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.22    FLOW VELOCITY(FEET/SEC.) =    3.14
 LONGEST FLOWPATH FROM NODE      91.00 TO NODE      93.00 =      556.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      93.00 TO NODE      94.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     149.10  DOWNSTREAM(FEET) =     148.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    180.00   CHANNEL SLOPE = ·0.0061
 CHANNEL BASE(FEET) =    10.00    "Z" FACTOR =  10.000
 MANNING'S FACTOR = 0.015    MAXIMUM DEPTH(FEET) =     1.00
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.610
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/       SCS SOIL   AREA       Fp          Ap       SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)   (DECIMAL)   CN
 APARTMENTS                   A        1.70       0.40      0.200     32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       10.30
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =    2.88
 AVERAGE FLOW DEPTH(FEET) =    0.28   TRAVEL TIME(MIN.) =    1.04
 Tc(MIN.) =    10.81
 SUBAREA AREA(ACRES) =       1.70      SUBAREA RUNOFF(CFS) =      3.87
 EFFECTIVE AREA(ACRES) =        5.16     AREA-AVERAGED Fm(INCH/HR) =    0.08
 AREA-AVERAGED Fp(INCH/HR) =    0.40  AREA-AVERAGED Ap =    0.20
 TOTAL AREA(ACRES) =          5.2          PEAK FLOW RATE(CFS) =        11.75

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.30    FLOW VELOCITY(FEET/SEC.) =    3.01
 LONGEST FLOWPATH FROM NODE      91.00 TO NODE      94.00 =      736.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      94.00 TO NODE      95.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =     148.00  DOWNSTREAM(FEET) =     137.00
 FLOW LENGTH(FEET) =     130.00    MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.54
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =    1
```

PIPE-FLOW(CFS) = 11.75
PIPE TRAVEL TIME(MIN.) = 0.14 Tc(MIN.) = 10.95
LONGEST FLOWPATH FROM NODE 91.00 TO NODE 95.00 = 866.00 FEET.

****
FLOW PROCESS FROM NODE 95.00 TO NODE 95.00 IS CODE = 1

>>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==
TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 10.95
RAINFALL INTENSITY(INCH/HR) = 2.59
AREA-AVERAGED Fm(INCH/HR) = 0.08
AREA-AVERAGED Fp(INCH/HR) = 0.40
AREA-AVERAGED Ap = 0.20
EFFECTIVE STREAM AREA(ACRES) = 5.16
TOTAL STREAM AREA(ACRES) = 5.16
PEAK FLOW RATE(CFS) AT CONFLUENCE = 11.75

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	29.78	7.65	3.181	0.40(0.06)	0.15	8.5	70.10
1	30.87	8.38	3.020	0.40(0.06)	0.15	9.4	68.00
1	31.77	9.07	2.886	0.40(0.06)	0.15	10.2	65.10
1	31.86	9.13	2.875	0.40(0.06)	0.15	10.2	67.10
1	32.09	9.29	2.846	0.40(0.06)	0.15	10.5	72.10
1	32.96	9.95	2.737	0.40(0.06)	0.15	11.3	63.10
1	33.21	10.17	2.703	0.40(0.06)	0.15	11.6	68.10
1	34.13	12.05	2.452	0.40(0.06)	0.15	13.5	64.10
1	34.13	12.06	2.451	0.40(0.06)	0.15	13.5	66.10
1	34.15	12.63	2.387	0.40(0.06)	0.15	13.9	62.10
1	33.46	15.22	2.145	0.40(0.06)	0.15	15.7	61.00
1	30.33	21.68	1.751	0.40(0.06)	0.15	17.9	71.10
2	11.75	10.95	2.591	0.40(0.08)	0.20	5.2	91.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	39.92	7.65	3.181	0.40(0.07)	0.16	12.1	70.10
2	41.39	8.38	3.020	0.40(0.07)	0.16	13.3	68.00
3	42.64	9.07	2.886	0.40(0.07)	0.16	14.4	65.10
4	42.76	9.13	2.875	0.40(0.07)	0.16	14.5	67.10
5	43.07	9.29	2.846	0.40(0.07)	0.16	14.8	72.10
6	44.25	9.95	2.737	0.40(0.07)	0.17	16.0	63.10
7	44.61	10.17	2.703	0.40(0.07)	0.17	16.4	68.10
8	45.34	10.95	2.591	0.40(0.07)	0.17	17.5	91.00
9	45.23	12.05	2.452	0.40(0.07)	0.17	18.6	64.10
10	45.23	12.06	2.451	0.40(0.07)	0.17	18.6	66.10
11	44.95	12.63	2.387	0.40(0.07)	0.17	19.1	62.10
12	43.13	15.22	2.145	0.40(0.07)	0.16	20.8	61.00
13	38.15	21.68	1.751	0.40(0.06)	0.16	23.0	71.10

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 45.34 Tc(MIN.) = 10.95
EFFECTIVE AREA(ACRES) = 17.54 AREA-AVERAGED Fm(INCH/HR) = 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.17
TOTAL AREA(ACRES) = 23.0
LONGEST FLOWPATH FROM NODE 61.00 TO NODE 95.00 = 2161.00 FEET.
==
END OF STUDY SUMMARY:
TOTAL AREA(ACRES) = 23.0 TC(MIN.) = 10.95
EFFECTIVE AREA(ACRES) = 17.54 AREA-AVERAGED Fm(INCH/HR)= 0.07
AREA-AVERAGED Fp(INCH/HR) = 0.40 AREA-AVERAGED Ap = 0.167
PEAK FLOW RATE(CFS) = 45.34

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	39.92	7.65	3.181	0.40(0.07)	0.16	12.1	70.10
2	41.39	8.38	3.020	0.40(0.07)	0.16	13.3	68.00
3	42.64	9.07	2.886	0.40(0.07)	0.16	14.4	65.10
4	42.76	9.13	2.875	0.40(0.07)	0.16	14.5	67.10
5	43.07	9.29	2.846	0.40(0.07)	0.16	14.8	72.10
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13	38.15	21.68	1.751	0.40(0.06)	0.16	23.0	71.10

==
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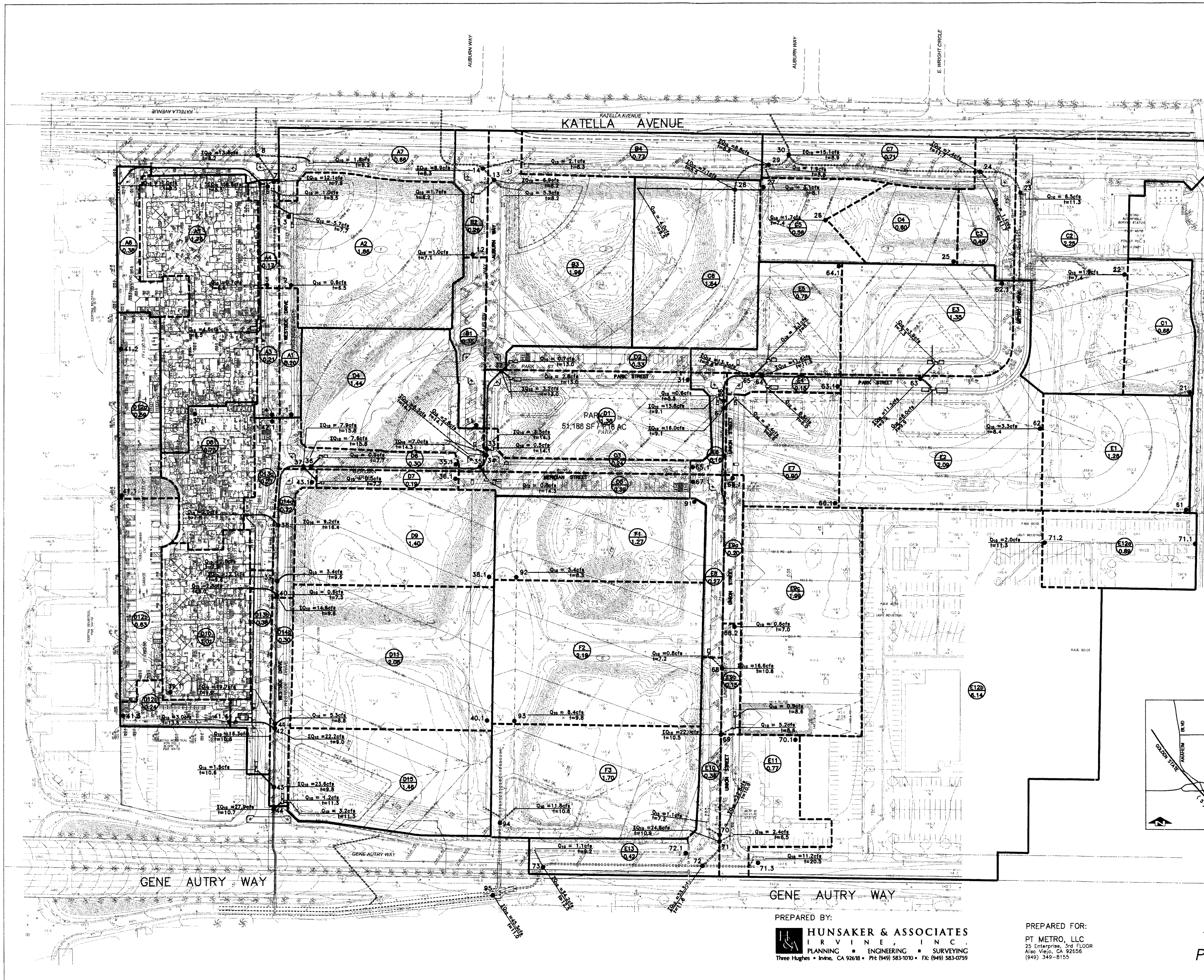
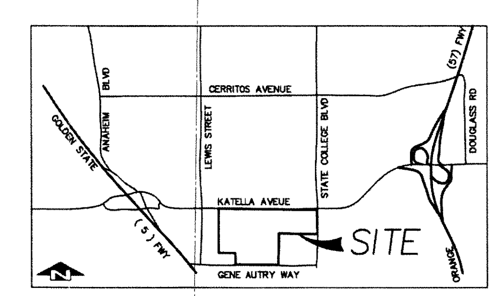
END OF RATIONAL METHOD ANALYSIS



LEGEND

- MAJOR DRAINAGE BOUNDARY
- MINOR DRAINAGE BOUNDARY
- 100 NODE NUMBER
- A / 1.0 AREA DESIGNATION / AREA ACREAGE (IN ACRES)
- PEAK FLOW RATE / TIME OF CONCENTRATION
- PEAK CONFLUENCE FLOW RATE / TIME OF CONCENTRATION
- PROPOSED STORM DRAIN
- A SOIL GROUP



VICINITY MAP

N.T.S.

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HYDROLOGY STUDY FOR A-TOWN TRACTS 17703 & 16859 PROPOSED CONDITION

W.O. 3916-8

APR 2 3 2015