PRELIMINARY TECHNICAL DRAINAGE STUDY

KAISER PERMANENTE MORENO VALLEY MEDICAL CENTER

City of Moreno Valley, California
January 30, 2019

Prepared for:

Revision History	
1/2019	2nd Submittal

CITY OF MORENO VALLEY CASE # XXXXXXX

LST18-0052
PEN18-0228 - 0230

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I. INTRODUCTION

This drainage study for Kaiser Permanente Moreno Valley Medical Center accompanies the development plan. It specifically accomplishes the following:

- Determine the peak onsite 10 & 100-year runoff according to the precise grading plan.

- Define design for storm drain systems to convey the offsite and onsite flows.

1. Area Description

The project site is in the City of Moreno Valley in the County of Riverside, California. It is located between Nason Street and Oliver Street and North of Iris Avenue. The project site will be developed in 29.8 acres of combined area of APN 486-310-033 and 486-310-034, with current legal descriptions as parcel 6 and 7 of Parcel Map MB 11/10. These two parcels have full width improvements with curb and within the property limits. Figure 1 shows the location of this project.

2. Project Description

The proposed project will develop three (3) multi-story parking structures, an energy center, emergency department, two (2) medical office buildings, multi-story patient bed towers, new D&T building, driveways, walkways, and landscape areas. It will develop 27.7 acres of the combined area parcel 7 and 6 of Parcel map MB 11/10 with the 2.1 acres of existing parking lot and medical office to remain. All on-site facilities will be privately maintained.

3. Surrounding Projects and Drainage Considerations

The project site is currently a Kaiser Permanente Medical Center and office along with a pharmacy. It has been a medical facility for as long back as two decades. It has moderate vegetation, and it has relatively flat terrain draining from southeast to northwest to the adjacent property to the northwest. There is expected to be no offsite flow oncoming to the property as the perimeter of the worked area contains berms and measures to keep offsite flow away. There is currently no storm drain network located in the site. The report was completed with a conceptual design of the project and will be updated to reflect revisions made to the grading plan or the site plan.

II. HYDROLOGIC/HYDRAULIC METHODOLOGY

The methodology presented in this study is in compliance with the RCFC&WCD 1978 Hydrology Manual (Reference 5), hereinafter referred to as the Manual).

Model Descriptions -The Integrated Rational Method Hydrology System Model Version 8.0, dated January 1, 2006, (Reference 3) within the Advanced Engineering Systems Software (AES) was used to generate the peak 100-year onsite flows.

Soil Type - The Manual utilizes the Soil Conservation Service (SCS) soil classification system, which classifies soils into four (4) hydrological groups (HSG): A through D, with D being the least pervious. The soil Plates C-1.17 of the Manual showing location of project is included in Appendix B. According to this figure, this tract is located within a mixture of HSG “A”, HSG “B”. For this report, HSG “B” was conservatively used in the hydrologic models.

Development Type- For the proposed developed conditions the runoff was calculated considering a commercial development.

Intensity- The 10-minute / 60-minute intensity values (inches/hour) for the 10-year and 100-year storm events, obtained from Plate D-4.1 (6 of 6) of the Manual, are 2.01/0.82 and 2.94/1.20, respectively.

Drainage Areas and Flow Patterns - The drainage areas and flow patterns for existing and proposed conditions were determined using the existing topography (Cad) and the Tentative Tract Map, respectively. The areas were measured using the computer capabilities of AutoCAD.

III. HYDROLOGY/HYDRAULIC ANALYSIS

Figure 3 in Appendix A shows the proposed onsite drainage patterns for this project. The majority of the flows will be conveyed through a storm drain system which travel through various basins and storage facilities to treat the runoff. Velocities in the pipes will vary from 6 fps to 9 fps and are subject to change due to the conceptual nature of the storm drain system that is subject to change. These pipes will outlet to existing storm water overflow paths separated by east and west.

The undeveloped conditions outflows to the west overflow path at 32.58/48.25 CFS for the 10-year and 100-year storm respectively. The eastern overflow path received a flow of 16.22/23.77 CFS for the 10-year and 100-year storm respectively.

The developed conditions of the site outflow to the same over flow paths with the western overflow receiving 19.21/28.18 CFS for the 10-year and 100-year storm respectively. The eastern overflow path will receive 36.56/54.73 CFS for the 10-year and 100-year storm respectively.

Hydraulic analysis was performed on major sections of the storm drain network to size for the 100-year storm event. See Appendix C for data pertaining to the size of the network.

The flow going to the discharge points of the developed site are subject to change as the site plans develops past the conceptual level.

IV. CONCLUSIONS

1. Methodology used in this report is in compliance with the Riverside County Flood Control and Water Conservation District.
2. There are no anticipated negative downstream or upstream impacts.

VI. REFERENCES

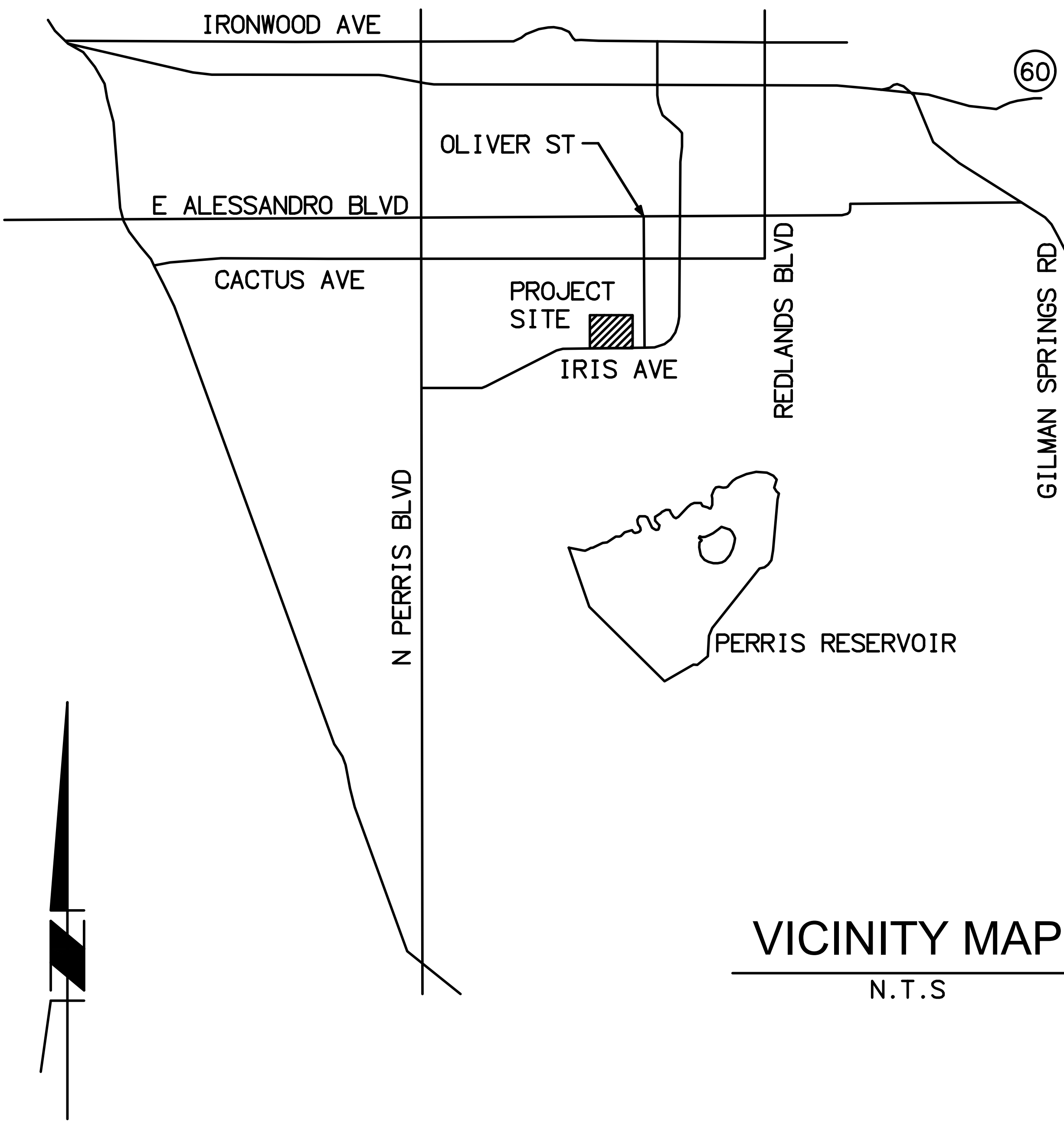
1. AEI-CASC Engineering, Hydrology Study Report for Bluestone Murrieta, October 5, 2001.

2. Riverside Flood Control District and Water Conservation District (RCFC&WCD) *Hydrology Manual*, 1978.

3. Advanced Engineering Systems Software (AES), Rational Method Hydrology System Model Version 8.0, January 1, 2006.

4. Advanced Engineering Systems Software (AES), Hydraulic Elements Program Package (HELE1) Version 8.0, January 1, 2006.

5. Riverside Flood Control District and Water Conservation District, Riverside Design Handbook or Low Impact Development, Best Management Practices, September 2011.



VICINITY MAP

N.T.S

FIGURE 1

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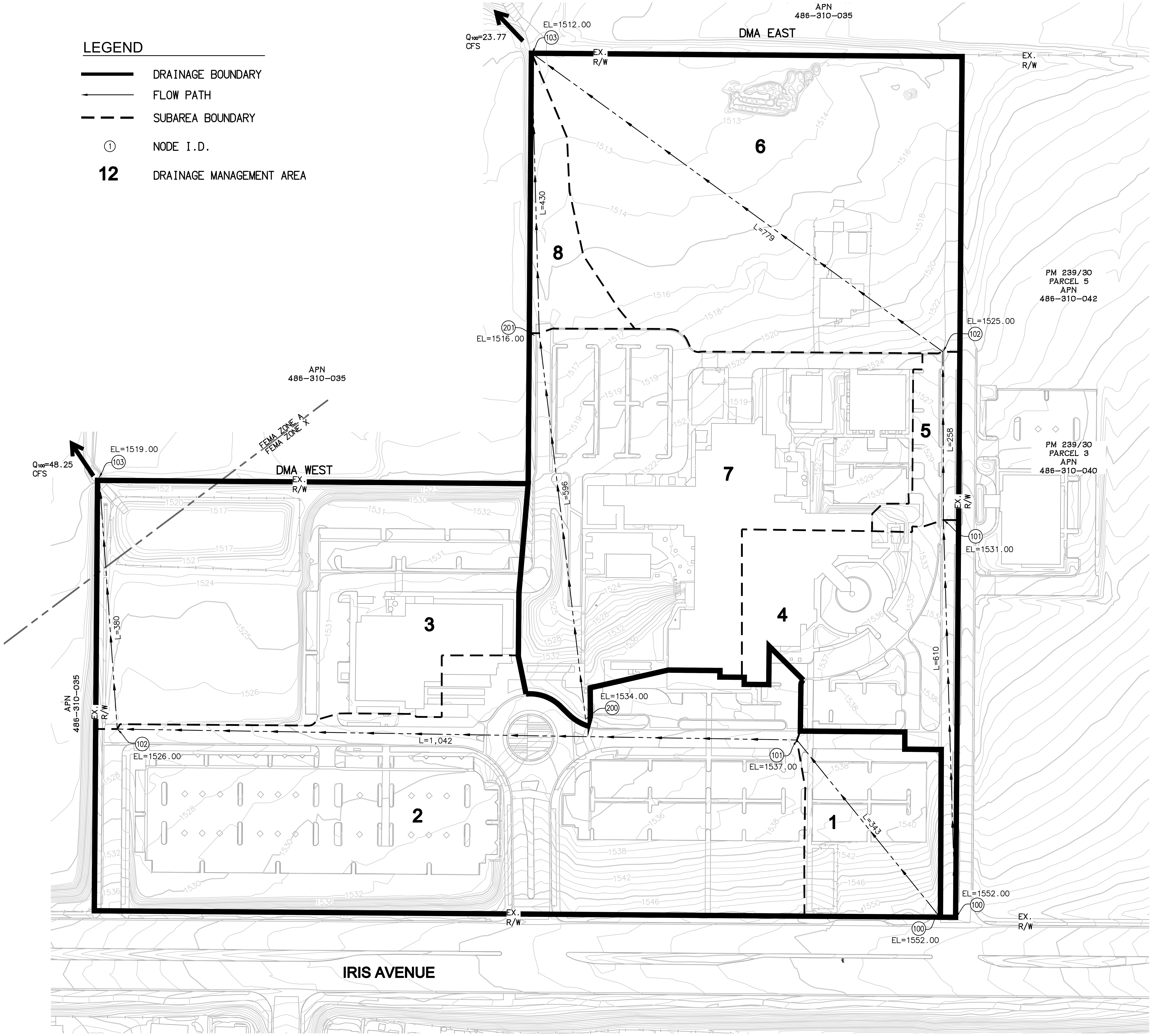
KAISER PERMANENTE MORENO VALLEY AREAMASTER PLAN AND MEDICAL OFFICE BUILDING

VICINITY MAP

APPENDIX A

HYDROLOGY CALCULATIONS

Undeveloped Condition
10 & 100-Year Hydrology
Rational Method Calculations



DMA WEST

DMA	SIZE [ACRE]
1	1.34
2	8.21
3	5.21

DMA EAST

DMA	SIZE [ACRE]
4	2.36
5	0.48
6	6.05
7	5.69
8	0.67

80 40 0 80 160 240
SCALE: 1"=80'

Michael Baker
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9755 Clairemont Mesa Blvd., San Diego, CA 92124
Phone: (858) 614-5000 · MBAKERINTL.COM

FIGURE 2-EXISTING

HYDROLOGY MAP - EXISTING CONDITIONS Q100

KAISER MEDICAL MORENO VALLEY

\\SANDCA1FS1.BKR.MBAKERCORP.COM\HROOT\PDATA\169814\CADD\STRMWATER\FIGURE 2 - EXISTING HYD MAP.DWG JESSICA.JONES 1/30/19 10:46 am

```
____________________________________________________________________________
****************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                     (RCFC&WCD)  1978 HYDROLOGY MANUAL
         (c) Copyright 1982-2013 Advanced Engineering Software (aes)
                     (Rational Tabling Version 20.0)
                  Release Date: 06/01/2013  License ID 1264

                          Analysis prepared by:





 ************************** DESCRIPTION OF STUDY **************************
* KAISER PERMANENTE MORENO VALLEY MEDICAL CENTER                            *
* ON-SITE HYDROLOGY                                                        *
* 10-YEAR STORM EVENT EXISTING CONDITIONS                                  *
 **************************************************************************

  FILE NAME: PREW10.DAT
  TIME/DATE OF STUDY: 10:25 01/30/2019
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.010
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.820
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.940
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.200
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.5003939
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.5001161
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   10.00   1-HOUR INTENSITY(INCH/HOUR) =   0.828
  SLOPE OF INTENSITY DURATION CURVE = 0.5004
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *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.*

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
```

```
TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
INITIAL SUBAREA FLOW-LENGTH(FEET) =   343.00
UPSTREAM ELEVATION(FEET) =   1552.00
DOWNSTREAM ELEVATION(FEET) =   1537.00
ELEVATION DIFFERENCE(FEET) =     15.00
TC = 0.303*[(  343.00**3)/(    15.00)]**.2 =    5.855
  10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.654
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8745
SOIL CLASSIFICATION IS "B"
SUBAREA RUNOFF(CFS) =      3.11
TOTAL AREA(ACRES) =      1.34   TOTAL RUNOFF(CFS) =      3.11

****************************************************************************
FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  51
----------------------------------------------------------------------------
>>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
>>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   1537.00  DOWNSTREAM(FEET) =   1526.00
CHANNEL LENGTH THRU SUBAREA(FEET) =  1042.00   CHANNEL SLOPE =  0.0106
CHANNEL BASE(FEET) =    1.50   "Z" FACTOR =  12.500
MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.12

       ==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL
           CAPACITY( NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
           ALLOWABLE DEPTH).
           AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
           ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.

  10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.545
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8738
SOIL CLASSIFICATION IS "B"
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.25
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  34.03
AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   0.51
Tc(MIN.) =    6.37
SUBAREA AREA(ACRES) =     8.21       SUBAREA RUNOFF(CFS) =   18.26
TOTAL AREA(ACRES) =        9.6         PEAK FLOW RATE(CFS) =      21.37

       ==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL
           CAPACITY( NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
           ALLOWABLE DEPTH).
           AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
           ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.


END OF SUBAREA CHANNEL FLOW HYDRAULICS:
DEPTH(FEET) =  0.12   FLOW VELOCITY(FEET/SEC.) =  59.35

==>FLOWDEPTH EXCEEDS MAXIMUM ALLOWABLE DEPTH

LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =    1385.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  91
----------------------------------------------------------------------------
>>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
UPSTREAM NODE ELEVATION(FEET) =   1526.00
DOWNSTREAM NODE ELEVATION(FEET) =   1519.00
CHANNEL LENGTH THRU SUBAREA(FEET) =   380.00
"V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.500
PAVEMENT LIP(FEET) =  0.100   MANNING'S N = .0150
```

```
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.10000
  MAXIMUM DEPTH(FEET) =   0.61
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.464
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8732
  SOIL CLASSIFICATION IS "B"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     26.97
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  14.98
  AVERAGE FLOW DEPTH(FEET) =   0.61   FLOOD WIDTH(FEET) =    5.20
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.42   Tc(MIN.) =    6.79
  SUBAREA AREA(ACRES) =    5.21       SUBAREA RUNOFF(CFS) =   11.21
  TOTAL AREA(ACRES) =       14.8         PEAK FLOW RATE(CFS) =      32.58

         ==>>ERROR:FLOW EXCEEDS CAPACITY OF CHANNEL WITH
             NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM ALLOWABLE DEPTH.
             AS AN APPROXIMATION, TRAVEL TIME CALCULATIONS ARE BASED
             ON FLOW DEPTH EQUAL TO THE SPECIFIED MAXIMUM ALLOWABLE DEPTH.


  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.61   FLOOD WIDTH(FEET) =    5.20
  FLOW VELOCITY(FEET/SEC.) =  18.09   DEPTH*VELOCITY(FT*FT/SEC) =  11.03
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =    1765.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       14.8  TC(MIN.) =      6.79
  PEAK FLOW RATE(CFS)   =      32.58
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS

♀
```

```
****************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                  (RCFC&WCD)  1978 HYDROLOGY MANUAL
       (c) Copyright 1982-2013 Advanced Engineering Software (aes)
                  (Rational Tabling Version 20.0)
               Release Date: 06/01/2013  License ID 1264

                       Analysis prepared by:





 ************************** DESCRIPTION OF STUDY **************************
* KAISER PERMANENTE MORENO VALLEY MEDICAL CENTER                           *
* ON-SITE HYDROLOGY                                                       *
* 100-YEAR STORM EVENT EXISTING CONDITIONS                                *
 **************************************************************************

  FILE NAME: PREW100.DAT
  TIME/DATE OF STUDY: 10:21 01/30/2019
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.010
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.820
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.940
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.200
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.5003939
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.5001161
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.200
  SLOPE OF INTENSITY DURATION CURVE = 0.5001
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *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.*

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
```

```
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   343.00
  UPSTREAM ELEVATION(FEET) =   1552.00
  DOWNSTREAM ELEVATION(FEET) =   1537.00
  ELEVATION DIFFERENCE(FEET) =     15.00
  TC = 0.303*[(  343.00**3)/(    15.00)]**.2 =    5.855
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.842
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8807
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      4.53
  TOTAL AREA(ACRES) =      1.34   TOTAL RUNOFF(CFS) =      4.53

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1537.00  DOWNSTREAM(FEET) =   1526.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1042.00   CHANNEL SLOPE =  0.0106
  CHANNEL BASE(FEET) =    1.50   "Z" FACTOR =  12.500
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.12

         ==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL
             CAPACITY( NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
             ALLOWABLE DEPTH).
             AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
             ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.

   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.733
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8803
  SOIL CLASSIFICATION IS "B"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      18.03
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  50.09
  AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   0.35
  Tc(MIN.) =    6.20
  SUBAREA AREA(ACRES) =     8.21       SUBAREA RUNOFF(CFS) =   26.98
  TOTAL AREA(ACRES) =        9.6         PEAK FLOW RATE(CFS) =      31.52

         ==>>WARNING: FLOW IN CHANNEL EXCEEDS CHANNEL
             CAPACITY( NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM
             ALLOWABLE DEPTH).
             AS AN APPROXIMATION, FLOWDEPTH IS SET AT MAXIMUM
             ALLOWABLE DEPTH AND IS USED FOR TRAVELTIME CALCULATIONS.


  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.12   FLOW VELOCITY(FEET/SEC.) =  87.55

  ==>FLOWDEPTH EXCEEDS MAXIMUM ALLOWABLE DEPTH

  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =    1385.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =   1526.00
  DOWNSTREAM NODE ELEVATION(FEET) =   1519.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   380.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.500
  PAVEMENT LIP(FEET) =  0.100   MANNING'S N = .0150
```

```
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.10000
  MAXIMUM DEPTH(FEET) =   0.61
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.650
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8799
  SOIL CLASSIFICATION IS "B"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     39.88
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  22.15
  AVERAGE FLOW DEPTH(FEET) =   0.61   FLOOD WIDTH(FEET) =    5.20
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.29   Tc(MIN.) =    6.49
  SUBAREA AREA(ACRES) =    5.21       SUBAREA RUNOFF(CFS) =   16.73
  TOTAL AREA(ACRES) =       14.8         PEAK FLOW RATE(CFS) =      48.25

         ==>>ERROR:FLOW EXCEEDS CAPACITY OF CHANNEL WITH
             NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM ALLOWABLE DEPTH.
             AS AN APPROXIMATION, TRAVEL TIME CALCULATIONS ARE BASED
             ON FLOW DEPTH EQUAL TO THE SPECIFIED MAXIMUM ALLOWABLE DEPTH.


  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.61   FLOOD WIDTH(FEET) =    5.20
  FLOW VELOCITY(FEET/SEC.) =  26.79   DEPTH*VELOCITY(FT*FT/SEC) =  16.34
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =    1765.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       14.8  TC(MIN.) =      6.49
  PEAK FLOW RATE(CFS)   =      48.25
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS

♀
```

```
****************************************************************************
           RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
       RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                   (RCFC&WCD)  1978 HYDROLOGY MANUAL
        (c) Copyright 1982-2013 Advanced Engineering Software (aes)
                   (Rational Tabling Version 20.0)
                Release Date: 06/01/2013  License ID 1264

                        Analysis prepared by:




 ************************** DESCRIPTION OF STUDY **************************
* KAISER PERMANENTE MORENO VALLEY MEDICAL CENTER                             *
* ON-SITE HYDROLOGY                                                         *
* 10-YEAR STORM EVENT EXISTING CONDITIONS                                   *
 **************************************************************************

  FILE NAME: PREE10.DAT
  TIME/DATE OF STUDY: 10:43 01/30/2019
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.010
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.820
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.940
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.200
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.5003939
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.5001161
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   10.00   1-HOUR INTENSITY(INCH/HOUR) =   0.828
  SLOPE OF INTENSITY DURATION CURVE = 0.5004
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *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.*

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
```

```
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   610.00
  UPSTREAM ELEVATION(FEET) =   1552.00
  DOWNSTREAM ELEVATION(FEET) =   1531.00
  ELEVATION DIFFERENCE(FEET) =     21.00
  TC = 0.303*[(  610.00**3)/(    21.00)]**.2 =    7.733
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.309
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8719
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      4.75
  TOTAL AREA(ACRES) =      2.36   TOTAL RUNOFF(CFS) =      4.75

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =   1531.00
  DOWNSTREAM NODE ELEVATION(FEET) =   1525.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   258.00
  "V" GUTTER WIDTH(FEET) =   1.50   GUTTER HIKE(FEET) =  0.120
  PAVEMENT LIP(FEET) =  0.120   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.10000
  MAXIMUM DEPTH(FEET) =   0.25
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.274
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8716
  SOIL CLASSIFICATION IS "B"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      5.23
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  18.28
  AVERAGE FLOW DEPTH(FEET) =   0.25   FLOOD WIDTH(FEET) =    1.70
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.24   Tc(MIN.) =    7.97
  SUBAREA AREA(ACRES) =    0.48       SUBAREA RUNOFF(CFS) =    0.95
  TOTAL AREA(ACRES) =        2.8         PEAK FLOW RATE(CFS) =       5.70

         ==>>ERROR:FLOW EXCEEDS CAPACITY OF CHANNEL WITH
             NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM ALLOWABLE DEPTH.
             AS AN APPROXIMATION, TRAVEL TIME CALCULATIONS ARE BASED
             ON FLOW DEPTH EQUAL TO THE SPECIFIED MAXIMUM ALLOWABLE DEPTH.


  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.25   FLOOD WIDTH(FEET) =    1.70
  FLOW VELOCITY(FEET/SEC.) =  19.94   DEPTH*VELOCITY(FT*FT/SEC) =   4.98
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     868.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1525.00  DOWNSTREAM(FEET) =   1512.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   779.00   CHANNEL SLOPE =  0.0167
  CHANNEL FLOW THRU SUBAREA(CFS) =       5.70
  FLOW VELOCITY(FEET/SEC) =   2.81 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.62   Tc(MIN.) =   12.59
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =    1647.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 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.) =   12.59
  RAINFALL INTENSITY(INCH/HR) =   1.81
  TOTAL STREAM AREA(ACRES) =     2.84
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.70

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   596.00
  UPSTREAM ELEVATION(FEET) =  1534.00
  DOWNSTREAM ELEVATION(FEET) =   1516.00
  ELEVATION DIFFERENCE(FEET) =     18.00
  TC = 0.303*[(  596.00**3)/(    18.00)]**.2 =    7.865
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.289
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8717
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =     11.36
  TOTAL AREA(ACRES) =      5.69   TOTAL RUNOFF(CFS) =     11.36

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    103.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1516.00  DOWNSTREAM(FEET) =   1512.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   430.00   CHANNEL SLOPE =  0.0093
  CHANNEL FLOW THRU SUBAREA(CFS) =      11.36
  FLOW VELOCITY(FEET/SEC) =   2.49 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.88   Tc(MIN.) =   10.74
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    103.00 =    1026.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    103.00 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.) =   10.74
  RAINFALL INTENSITY(INCH/HR) =   1.96
  TOTAL STREAM AREA(ACRES) =     5.69
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.36

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        5.70    12.59        1.809          2.84
      2       11.36    10.74        1.959          5.69

 *********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 **************************************************************************
```

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       16.22    10.74       1.959
      2       16.19    12.59       1.809

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      16.22   Tc(MIN.) =   10.74
  TOTAL AREA(ACRES) =        8.5
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =    1647.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        8.5  TC(MIN.) =     10.74
  PEAK FLOW RATE(CFS)   =      16.22
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS

♀
```

```
****************************************************************************
         RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
     RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
               (RCFC&WCD)  1978 HYDROLOGY MANUAL
      (c) Copyright 1982-2013 Advanced Engineering Software (aes)
               (Rational Tabling Version 20.0)
            Release Date: 06/01/2013  License ID 1264

                   Analysis prepared by:




 ************************** DESCRIPTION OF STUDY **************************
* KAISER PERMANENTE MORENO VALLEY MEDICAL CENTER                           *
* ON-SITE HYDROLOGY                                                        *
* 100-YEAR STORM EVENT EXISTING CONDITIONS                                 *
 **************************************************************************

  FILE NAME: PREE100.DAT
  TIME/DATE OF STUDY: 10:38 01/30/2019
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.010
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.820
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.940
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.200
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.5003939
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.5001161
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.200
  SLOPE OF INTENSITY DURATION CURVE = 0.5001
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *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.*

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
```

```
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   610.00
  UPSTREAM ELEVATION(FEET) =   1552.00
  DOWNSTREAM ELEVATION(FEET) =   1531.00
  ELEVATION DIFFERENCE(FEET) =     21.00
  TC = 0.303*[(  610.00**3)/(    21.00)]**.2 =    7.733
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.343
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8785
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      6.93
  TOTAL AREA(ACRES) =      2.36   TOTAL RUNOFF(CFS) =      6.93

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =   1531.00
  DOWNSTREAM NODE ELEVATION(FEET) =   1525.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   258.00
  "V" GUTTER WIDTH(FEET) =   1.50   GUTTER HIKE(FEET) =  0.120
  PAVEMENT LIP(FEET) =  0.120   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.10000
  MAXIMUM DEPTH(FEET) =   0.25
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.309
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8784
  SOIL CLASSIFICATION IS "B"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      7.63
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  26.68
  AVERAGE FLOW DEPTH(FEET) =   0.25   FLOOD WIDTH(FEET) =    1.70
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.16   Tc(MIN.) =    7.89
  SUBAREA AREA(ACRES) =    0.48       SUBAREA RUNOFF(CFS) =    1.40
  TOTAL AREA(ACRES) =        2.8         PEAK FLOW RATE(CFS) =       8.33

         ==>>ERROR:FLOW EXCEEDS CAPACITY OF CHANNEL WITH
             NORMAL DEPTH EQUAL TO SPECIFIED MAXIMUM ALLOWABLE DEPTH.
             AS AN APPROXIMATION, TRAVEL TIME CALCULATIONS ARE BASED
             ON FLOW DEPTH EQUAL TO THE SPECIFIED MAXIMUM ALLOWABLE DEPTH.


  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.25   FLOOD WIDTH(FEET) =    1.70
  FLOW VELOCITY(FEET/SEC.) =  29.12   DEPTH*VELOCITY(FT*FT/SEC) =   7.28
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     868.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1525.00  DOWNSTREAM(FEET) =   1512.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   779.00   CHANNEL SLOPE =  0.0167
  CHANNEL FLOW THRU SUBAREA(CFS) =        8.33
  FLOW VELOCITY(FEET/SEC) =   3.08 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.21   Tc(MIN.) =   12.10
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =    1647.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 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.) =   12.10
  RAINFALL INTENSITY(INCH/HR) =   2.67
  TOTAL STREAM AREA(ACRES) =     2.84
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       8.33

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   596.00
  UPSTREAM ELEVATION(FEET) =   1534.00
  DOWNSTREAM ELEVATION(FEET) =   1516.00
  ELEVATION DIFFERENCE(FEET) =     18.00
  TC = 0.303*[(  596.00**3)/(    18.00)]**.2 =    7.865
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.315
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8784
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =     16.57
  TOTAL AREA(ACRES) =      5.69   TOTAL RUNOFF(CFS) =     16.57

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    103.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1516.00  DOWNSTREAM(FEET) =   1512.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   430.00   CHANNEL SLOPE =  0.0093
  CHANNEL FLOW THRU SUBAREA(CFS) =      16.57
  FLOW VELOCITY(FEET/SEC) =   2.75 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.61   Tc(MIN.) =   10.47
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    103.00 =    1026.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    103.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.47
  RAINFALL INTENSITY(INCH/HR) =   2.87
  TOTAL STREAM AREA(ACRES) =     5.69
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      16.57

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        8.33    12.10        2.672          2.84
      2       16.57    10.47        2.873          5.69

 *********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 **************************************************************************
```

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

** PEAK FLOW RATE TABLE **
STREAM     RUNOFF      Tc      INTENSITY
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
    1       23.77    10.47       2.873
    2       23.74    12.10       2.672

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =      23.77   Tc(MIN.) =   10.47
TOTAL AREA(ACRES) =        8.5
LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =    1647.00 FEET.
============================================================================
END OF STUDY SUMMARY:
TOTAL AREA(ACRES)     =        8.5  TC(MIN.) =     10.47
PEAK FLOW RATE(CFS)   =      23.77
============================================================================
============================================================================
END OF RATIONAL METHOD ANALYSIS
```

♀

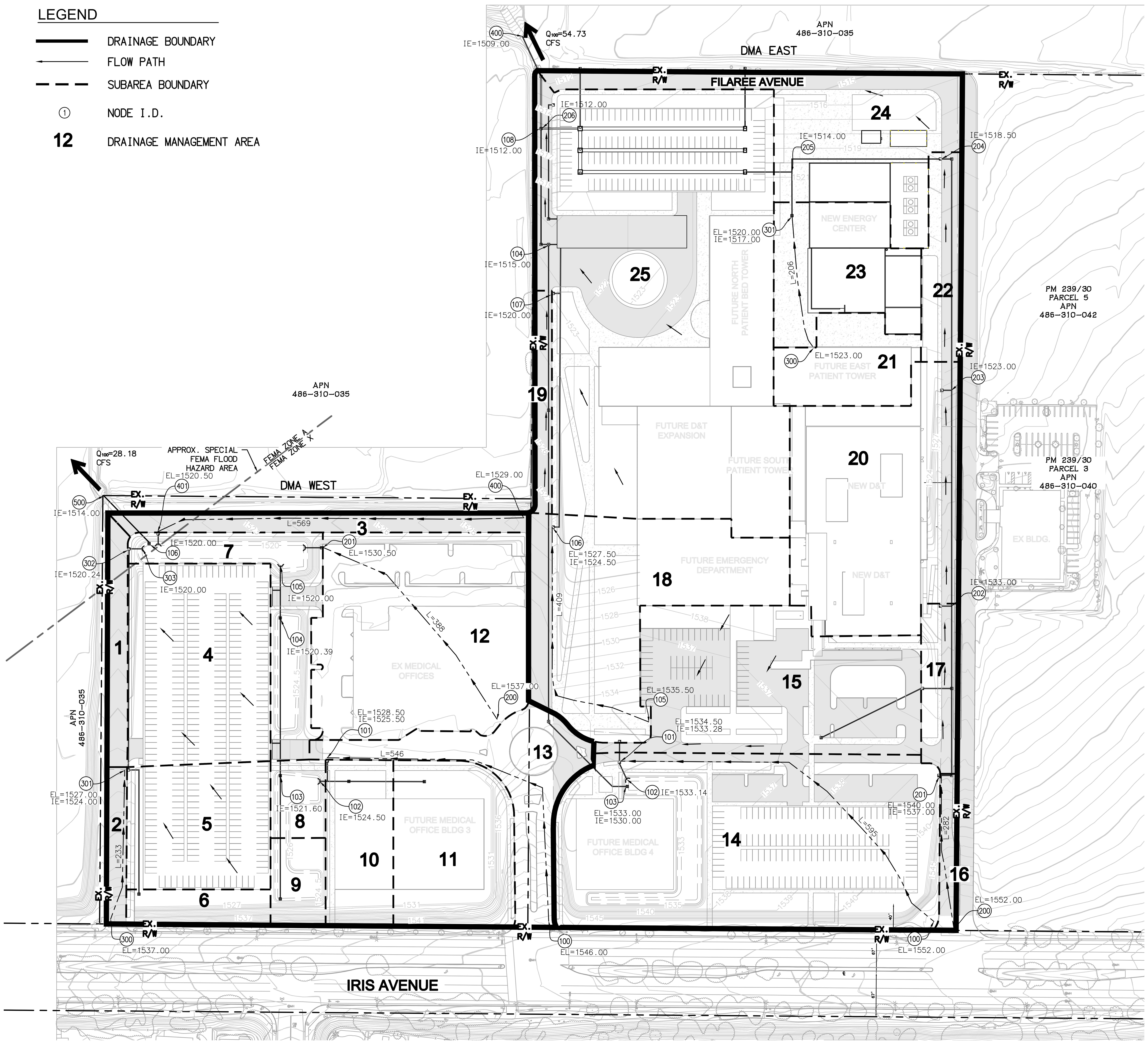
APPENDIX A

HYDROLOGY CALCULATIONS

Developed Condition
10 & 100-Year Hydrology
Rational Method Calculations

LEGEND

- DRAINAGE BOUNDARY
- FLOW PATH
- SUBAREA BOUNDARY
- ① NODE I.D.
- **12** DRAINAGE MANAGEMENT AREA



80 40 0 80 160 240
SCALE: 1"=80'

DMA WEST

DMA	SIZE [ACRE]
1	0.27
2	0.17
3	0.44
4	1.56
5	0.98
6	0.28
7	0.81
8	0.23
9	0.26
10	0.61
11	1.06
12	2.31
13	0.91

DMA EAST

DMA	SIZE [ACRE]
14	3.62
15	2.09
16	0.15
17	0.33
18	1.97
19	0.21
20	2.14
21	0.60
22	0.42
23	0.94
24	1.55
25	5.54

Michael Baker INTERNATIONAL
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Phone: (858) 614-5000 · MBAKERINTL.COM

FIGURE 3-PROPOSED
HYDROLOGY MAP - PROPOSED CONDITIONS Q100

KAISER MEDICAL MORENO VALLEY

\\SANDCATFS1.BKR.MBAKERCORP.COM\VROOT\PDATA\169814\CADD\STRMWATER\FIGURE 3 - PROPOSED HYD MAP.DWG JESSICA.JONES 1/29/19 1:23 pm

```
****************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
      RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                (RCFC&WCD)  1978 HYDROLOGY MANUAL
      (c) Copyright 1982-2013 Advanced Engineering Software (aes)
                (Rational Tabling Version 20.0)
             Release Date: 06/01/2013  License ID 1264

                     Analysis prepared by:





 ************************** DESCRIPTION OF STUDY **************************
* KAISER PERMANENTE MORENO VALLEY MEDICAL CENTER                            *
* ON-SITE HYDROLOGY                                                         *
* 10-YEAR STORM EVENT DEVELOPED CONDITIONS                                  *
 **************************************************************************

  FILE NAME: PROPW10.DAT
  TIME/DATE OF STUDY: 12:52 01/28/2019
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.010
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.820
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.940
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.200
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.5003939
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.5001161
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   10.00   1-HOUR INTENSITY(INCH/HOUR) =   0.828
  SLOPE OF INTENSITY DURATION CURVE = 0.5004
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *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.*

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
```

```
 TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   546.00
 UPSTREAM ELEVATION(FEET) =   1546.00
 DOWNSTREAM ELEVATION(FEET) =   1528.50
 ELEVATION DIFFERENCE(FEET) =     17.50
 TC = 0.303*[(  546.00**3)/(    17.50)]**.2 =    7.504
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.344
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8722
 SOIL CLASSIFICATION IS "B"
 SUBAREA RUNOFF(CFS) =      1.86
 TOTAL AREA(ACRES) =      0.91   TOTAL RUNOFF(CFS) =      1.86

****************************************************************************
 FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1525.50  DOWNSTREAM(FEET) =  1524.50
 FLOW LENGTH(FEET) =   100.50   MANNING'S N =  0.013
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.49
 GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.86
 PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =    7.88
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     646.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.288
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8717
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =    2.16   SUBAREA RUNOFF(CFS) =    4.31
 TOTAL AREA(ACRES) =        3.1   TOTAL RUNOFF(CFS) =       6.17
 TC(MIN.) =    7.88

****************************************************************************
 FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1521.60  DOWNSTREAM(FEET) =  1520.39
 FLOW LENGTH(FEET) =   239.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.85
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       6.17
 PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =    8.38
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =     885.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.217
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8711
 SOIL CLASSIFICATION IS "B"
```

```
  SUBAREA AREA(ACRES) =     0.81   SUBAREA RUNOFF(CFS) =     1.56
  TOTAL AREA(ACRES) =         3.9   TOTAL RUNOFF(CFS) =       7.73
  TC(MIN.) =    8.38

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1520.39  DOWNSTREAM(FEET) =  1520.00
  FLOW LENGTH(FEET) =    77.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.84
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.73
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =    8.51
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =     962.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 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.) =    8.51
  RAINFALL INTENSITY(INCH/HR) =   2.20
  TOTAL STREAM AREA(ACRES) =     3.88
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.73

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   388.00
  UPSTREAM ELEVATION(FEET) =   1537.00
  DOWNSTREAM ELEVATION(FEET) =   1530.50
  ELEVATION DIFFERENCE(FEET) =      6.50
  TC = 0.303*[(  388.00**3)/(     6.50)]**.2 =    7.453
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.352
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8723
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      4.74
  TOTAL AREA(ACRES) =      2.31   TOTAL RUNOFF(CFS) =      4.74

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    105.00 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.) =    7.45
  RAINFALL INTENSITY(INCH/HR) =   2.35
  TOTAL STREAM AREA(ACRES) =     2.31
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.74
```

```
 ** CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)   (ACRE)
     1        7.73     8.51        2.200         3.88
     2        4.74     7.45        2.352         2.31

********************************WARNING**********************************
 IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
 ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
 WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
*************************************************************************

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       11.51     7.45       2.352
     2       12.17     8.51       2.200

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      12.17   Tc(MIN.) =    8.51
 TOTAL AREA(ACRES) =        6.2
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =     962.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
        ASSUMED INITIAL SUBAREA UNIFORM
        DEVELOPMENT IS COMMERCIAL
 TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   233.00
 UPSTREAM ELEVATION(FEET) =   1537.00
 DOWNSTREAM ELEVATION(FEET) =   1527.00
 ELEVATION DIFFERENCE(FEET) =     10.00
 TC = 0.303*[(  233.00**3)/(    10.00)]**.2 =    5.035
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.862
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8759
 SOIL CLASSIFICATION IS "B"
 SUBAREA RUNOFF(CFS) =      0.43
 TOTAL AREA(ACRES) =      0.17   TOTAL RUNOFF(CFS) =      0.43

****************************************************************************
 FLOW PROCESS FROM NODE    301.00 TO NODE    301.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.862
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8759
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =    1.26   SUBAREA RUNOFF(CFS) =    3.16
 TOTAL AREA(ACRES) =        1.4   TOTAL RUNOFF(CFS) =       3.58
 TC(MIN.) =    5.04
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1524.00  DOWNSTREAM(FEET) =  1520.24
  FLOW LENGTH(FEET) =   337.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   9.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.33
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.58
  PIPE TRAVEL TIME(MIN.) =   1.05    Tc(MIN.) =    6.09
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     570.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    302.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.602
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8742
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    1.83   SUBAREA RUNOFF(CFS) =    4.16
  TOTAL AREA(ACRES) =        3.3   TOTAL RUNOFF(CFS) =       7.75
  TC(MIN.) =    6.09

****************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    303.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1520.24  DOWNSTREAM(FEET) =  1520.00
  FLOW LENGTH(FEET) =    19.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.86
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.75
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    6.12
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =     589.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.12
  RAINFALL INTENSITY(INCH/HR) =   2.60
  TOTAL STREAM AREA(ACRES) =     3.26
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.75

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    401.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
```

```
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   569.00
  UPSTREAM ELEVATION(FEET) =   1529.00
  DOWNSTREAM ELEVATION(FEET) =   1520.50
  ELEVATION DIFFERENCE(FEET) =      8.50
  TC = 0.303*[(  569.00**3)/(     8.50)]**.2 =    8.887
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.154
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8705
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      0.82
  TOTAL AREA(ACRES) =      0.44   TOTAL RUNOFF(CFS) =      0.82

****************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    303.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.89
  RAINFALL INTENSITY(INCH/HR) =   2.15
  TOTAL STREAM AREA(ACRES) =     0.44
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.82

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1         7.75     6.12        2.595          3.26
     2         0.82     8.89        2.154          0.44

 *********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 **************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF       Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1         8.32     6.12       2.595
     2         7.25     8.89       2.154

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       8.32   Tc(MIN.) =    6.12
  TOTAL AREA(ACRES) =        3.7
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =     589.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    105.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1         8.32     6.12       2.595        3.70
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    105.00 =     589.00 FEET.
```

```
 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
    1        12.17     8.51       2.200        6.19
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =     962.50 FEET.

*********************************WARNING**********************************
 IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
 ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
 WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
**************************************************************************

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc      INTENSITY
 NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
    1       17.06       6.12        2.595
    2       19.21       8.51        2.200

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      19.21   Tc(MIN.) =    8.51
 TOTAL AREA(ACRES) =        9.9

****************************************************************************
 FLOW PROCESS FROM NODE    106.00 TO NODE    500.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1517.00  DOWNSTREAM(FEET) =  1514.00
 FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.87
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       19.21
 PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =    8.67
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    500.00 =    1062.50 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =        9.9  TC(MIN.) =      8.67
 PEAK FLOW RATE(CFS)   =      19.21
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS

♀
```

```
****************************************************************************
         RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
     RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                (RCFC&WCD)  1978 HYDROLOGY MANUAL
      (c) Copyright 1982-2013 Advanced Engineering Software (aes)
               (Rational Tabling Version 20.0)
              Release Date: 06/01/2013  License ID 1264

                      Analysis prepared by:




 ************************** DESCRIPTION OF STUDY **************************
* KAISER PERMANENTE MORENO VALLEY MEDICAL CENTER                           *
* ON-SITE HYDROLOGY                                                        *
* 100-YEAR STORM EVENT DEVELOPED CONDITIONS                                *
 **************************************************************************

  FILE NAME: PROPW100.DAT
  TIME/DATE OF STUDY: 12:39 01/28/2019
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.010
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.820
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.940
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.200
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.5003939
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.5001161
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.200
  SLOPE OF INTENSITY DURATION CURVE = 0.5001
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *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.*

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
```

```
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   546.00
  UPSTREAM ELEVATION(FEET) =   1546.00
  DOWNSTREAM ELEVATION(FEET) =   1528.50
  ELEVATION DIFFERENCE(FEET) =     17.50
  TC = 0.303*[(  546.00**3)/(    17.50)]**.2 =    7.504
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.394
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8788
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      2.71
  TOTAL AREA(ACRES) =      0.91   TOTAL RUNOFF(CFS) =      2.71

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1525.50  DOWNSTREAM(FEET) =  1524.50
  FLOW LENGTH(FEET) =   100.50   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.88
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.71
  PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =    7.85
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     646.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.319
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8784
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    2.16   SUBAREA RUNOFF(CFS) =    6.30
  TOTAL AREA(ACRES) =        3.1   TOTAL RUNOFF(CFS) =       9.01
  TC(MIN.) =    7.85

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1521.60  DOWNSTREAM(FEET) =  1520.39
  FLOW LENGTH(FEET) =   239.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.47
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.01
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =    8.19
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =     885.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.248
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8780
  SOIL CLASSIFICATION IS "B"
```

```
  SUBAREA AREA(ACRES) =    0.81   SUBAREA RUNOFF(CFS) =    2.31
  TOTAL AREA(ACRES) =        3.9   TOTAL RUNOFF(CFS) =      11.32
  TC(MIN.) =    8.19

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1520.39  DOWNSTREAM(FEET) =  1520.00
  FLOW LENGTH(FEET) =    77.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.41
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.32
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    8.28
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =     962.50 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 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.) =    8.28
  RAINFALL INTENSITY(INCH/HR) =   3.23
  TOTAL STREAM AREA(ACRES) =     3.88
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.32

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   388.00
  UPSTREAM ELEVATION(FEET) =   1537.00
  DOWNSTREAM ELEVATION(FEET) =   1530.50
  ELEVATION DIFFERENCE(FEET) =      6.50
  TC = 0.303*[(  388.00**3)/(     6.50)]**.2 =    7.453
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.406
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8788
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      6.91
  TOTAL AREA(ACRES) =      2.31   TOTAL RUNOFF(CFS) =      6.91

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    105.00 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.) =    7.45
  RAINFALL INTENSITY(INCH/HR) =   3.41
  TOTAL STREAM AREA(ACRES) =     2.31
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.91
```

```
 ** CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       11.32     8.28        3.230          3.88
     2        6.91     7.45        3.406          2.31

*********************************WARNING**********************************
 IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
 ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
 WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
**************************************************************************

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       17.10     7.45       3.406
     2       17.88     8.28       3.230

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      17.88   Tc(MIN.) =    8.28
 TOTAL AREA(ACRES) =        6.2
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =     962.50 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
        ASSUMED INITIAL SUBAREA UNIFORM
        DEVELOPMENT IS COMMERCIAL
 TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   233.00
 UPSTREAM ELEVATION(FEET) =   1537.00
 DOWNSTREAM ELEVATION(FEET) =   1527.00
 ELEVATION DIFFERENCE(FEET) =     10.00
 TC = 0.303*[(  233.00**3)/(    10.00)]**.2 =    5.035
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.144
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8818
 SOIL CLASSIFICATION IS "B"
 SUBAREA RUNOFF(CFS) =      0.62
 TOTAL AREA(ACRES) =      0.17   TOTAL RUNOFF(CFS) =      0.62

****************************************************************************
 FLOW PROCESS FROM NODE    301.00 TO NODE    301.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.144
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8818
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =    1.26   SUBAREA RUNOFF(CFS) =    4.60
 TOTAL AREA(ACRES) =        1.4   TOTAL RUNOFF(CFS) =       5.23
 TC(MIN.) =    5.04
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1524.00  DOWNSTREAM(FEET) =  1520.24
  FLOW LENGTH(FEET) =   337.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.65
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.23
  PIPE TRAVEL TIME(MIN.) =   0.84    Tc(MIN.) =    5.88
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     570.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    302.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.835
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8807
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    1.83   SUBAREA RUNOFF(CFS) =    6.18
  TOTAL AREA(ACRES) =        3.3   TOTAL RUNOFF(CFS) =      11.41
  TC(MIN.) =    5.88

****************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    303.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1520.24  DOWNSTREAM(FEET) =  1520.00
  FLOW LENGTH(FEET) =    19.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.52
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.41
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    5.90
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =     589.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.90
  RAINFALL INTENSITY(INCH/HR) =   3.83
  TOTAL STREAM AREA(ACRES) =     3.26
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.41

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    401.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
```

```
        DEVELOPMENT IS COMMERCIAL
 TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   569.00
 UPSTREAM ELEVATION(FEET) =   1529.00
 DOWNSTREAM ELEVATION(FEET) =   1520.50
 ELEVATION DIFFERENCE(FEET) =      8.50
 TC = 0.303*[(  569.00**3)/(     8.50)]**.2 =    8.887
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.119
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8774
 SOIL CLASSIFICATION IS "B"
 SUBAREA RUNOFF(CFS) =      1.20
 TOTAL AREA(ACRES) =      0.44   TOTAL RUNOFF(CFS) =      1.20

****************************************************************************
 FLOW PROCESS FROM NODE    401.00 TO NODE    303.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    8.89
 RAINFALL INTENSITY(INCH/HR) =   3.12
 TOTAL STREAM AREA(ACRES) =     0.44
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.20

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       11.41     5.90        3.827          3.26
     2        1.20     8.89        3.119          0.44

 *********************************WARNING**********************************
 IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
 ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
 WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 **************************************************************************

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       12.20     5.90       3.827
     2       10.50     8.89       3.119

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      12.20   Tc(MIN.) =    5.90
 TOTAL AREA(ACRES) =        3.7
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =     589.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    303.00 TO NODE    105.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1       12.20     5.90       3.827        3.70
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    105.00 =     589.00 FEET.
```

```
 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
    1        17.88     8.28       3.230        6.19
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =     962.50 FEET.

****************************WARNING**********************************
 IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
 ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
 WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
**********************************************************************

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc      INTENSITY
 NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
    1       24.94       5.90        3.827
    2       28.18       8.28        3.230

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      28.18   Tc(MIN.) =    8.28
 TOTAL AREA(ACRES) =        9.9

****************************************************************************
 FLOW PROCESS FROM NODE    106.00 TO NODE    500.00 IS CODE =  41
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1517.00  DOWNSTREAM(FEET) =  1514.00
 FLOW LENGTH(FEET) =   100.00    MANNING'S N =  0.013
 ASSUME FULL-FLOWING PIPELINE
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.95
 PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
 GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       28.18
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    8.39
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    500.00 =    1062.50 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =        9.9  TC(MIN.) =      8.39
 PEAK FLOW RATE(CFS)    =      28.18
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS

♀
```

```
********************************************************************************
           RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                   (RCFC&WCD)  1978 HYDROLOGY MANUAL
         (c) Copyright 1982-2013 Advanced Engineering Software (aes)
                   (Rational Tabling Version 20.0)
                Release Date: 06/01/2013  License ID 1264

                        Analysis prepared by:




 ************************** DESCRIPTION OF STUDY **************************
* KAISER PERMANENTE MORENO VALLEY MEDICAL CENTER                            *
* ON-SITE HYDROLOGY                                                         *
* 10-YEAR STORM EVENT DEVELOPED CONDITIONS                                  *
 **************************************************************************

  FILE NAME: PROPE10.DAT
  TIME/DATE OF STUDY: 13:29 01/29/2019
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.010
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.820
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.940
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.200
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.5003939
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.5001161
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =   10.00   1-HOUR INTENSITY(INCH/HOUR) =   0.828
  SLOPE OF INTENSITY DURATION CURVE = 0.5004
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *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.*

********************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
```

```
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   595.00
  UPSTREAM ELEVATION(FEET) =   1552.00
  DOWNSTREAM ELEVATION(FEET) =   1534.50
  ELEVATION DIFFERENCE(FEET) =     17.50
  TC = 0.303*[(  595.00**3)/(    17.50)]**.2 =    7.901
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.284
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8717
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      7.21
  TOTAL AREA(ACRES) =      3.62   TOTAL RUNOFF(CFS) =      7.21

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    101.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.284
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8717
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    2.09   SUBAREA RUNOFF(CFS) =    4.16
  TOTAL AREA(ACRES) =        5.7   TOTAL RUNOFF(CFS) =      11.37
  TC(MIN.) =    7.90

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1533.28  DOWNSTREAM(FEET) =  1533.14
  FLOW LENGTH(FEET) =    27.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.48
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.37
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    7.93
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     622.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1533.14  DOWNSTREAM(FEET) =  1533.00
  FLOW LENGTH(FEET) =     8.80   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.48
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.37
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    7.94
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =     630.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1530.00  DOWNSTREAM(FEET) =  1515.00
```

```
  FLOW LENGTH(FEET) =   895.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.48
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.37
  PIPE TRAVEL TIME(MIN.) =   1.03    Tc(MIN.) =    8.97
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =    1525.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 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.) =    8.97
  RAINFALL INTENSITY(INCH/HR) =   2.14
  TOTAL STREAM AREA(ACRES) =     5.71
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.37

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    106.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   409.00
  UPSTREAM ELEVATION(FEET) =   1535.50
  DOWNSTREAM ELEVATION(FEET) =   1527.50
  ELEVATION DIFFERENCE(FEET) =      8.00
  TC = 0.303*[(  409.00**3)/(     8.00)]**.2 =    7.379
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.364
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8724
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      4.06
  TOTAL AREA(ACRES) =      1.97   TOTAL RUNOFF(CFS) =      4.06

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    107.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1524.50  DOWNSTREAM(FEET) =  1520.00
  FLOW LENGTH(FEET) =   367.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.17
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.06
  PIPE TRAVEL TIME(MIN.) =   1.18    Tc(MIN.) =    8.56
  LONGEST FLOWPATH FROM NODE    105.00 TO NODE    107.00 =     776.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    107.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.194
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8709
```

```
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    5.75   SUBAREA RUNOFF(CFS) =   10.99
  TOTAL AREA(ACRES) =        7.7   TOTAL RUNOFF(CFS) =      15.05
  TC(MIN.) =    8.56

****************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    104.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1520.00  DOWNSTREAM(FEET) =  1515.00
  FLOW LENGTH(FEET) =    92.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.16
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      15.05
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    8.64
  LONGEST FLOWPATH FROM NODE    105.00 TO NODE    104.00 =     868.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 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.) =    8.64
  RAINFALL INTENSITY(INCH/HR) =   2.18
  TOTAL STREAM AREA(ACRES) =     7.72
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     15.05

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       11.37     8.97        2.143          5.71
     2       15.05     8.64        2.184          7.72

 *********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 **************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       26.00     8.64        2.184
     2       26.14     8.97        2.143

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      26.00   Tc(MIN.) =    8.64
  TOTAL AREA(ACRES) =        13.4
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =    1525.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    108.00 IS CODE =  41
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1515.00  DOWNSTREAM(FEET) =  1512.00
  FLOW LENGTH(FEET) =   186.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  33.10
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.00
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    8.74
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    108.00 =    1711.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   282.00
  UPSTREAM ELEVATION(FEET) =   1552.00
  DOWNSTREAM ELEVATION(FEET) =   1540.00
  ELEVATION DIFFERENCE(FEET) =     12.00
  TC = 0.303*[(  282.00**3)/(    12.00)]**.2 =    5.444
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.752
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8752
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      0.36
  TOTAL AREA(ACRES) =      0.15   TOTAL RUNOFF(CFS) =      0.36

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1537.00  DOWNSTREAM(FEET) =  1533.00
  FLOW LENGTH(FEET) =   277.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   2.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.26
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.36
  PIPE TRAVEL TIME(MIN.) =   1.42    Tc(MIN.) =    6.86
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     559.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.451
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8731
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    0.33   SUBAREA RUNOFF(CFS) =    0.71
  TOTAL AREA(ACRES) =       0.5   TOTAL RUNOFF(CFS) =       1.07
```

```
  TC(MIN.) =    6.86

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    203.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1533.00  DOWNSTREAM(FEET) =  1523.00
  FLOW LENGTH(FEET) =   332.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   3.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.80
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =        1.07
  PIPE TRAVEL TIME(MIN.) =   0.95    Tc(MIN.) =    7.82
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    203.00 =     891.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    203.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.297
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8718
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    2.14   SUBAREA RUNOFF(CFS) =    4.28
  TOTAL AREA(ACRES) =        2.6   TOTAL RUNOFF(CFS) =       5.35
  TC(MIN.) =    7.82

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1523.00  DOWNSTREAM(FEET) =  1518.50
  FLOW LENGTH(FEET) =   372.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.81
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =        5.35
  PIPE TRAVEL TIME(MIN.) =   0.91    Tc(MIN.) =    8.73
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    204.00 =    1263.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    204.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.173
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8707
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    0.42   SUBAREA RUNOFF(CFS) =    0.79
  TOTAL AREA(ACRES) =        3.0   TOTAL RUNOFF(CFS) =       6.15
  TC(MIN.) =    8.73

****************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    205.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =  1518.50  DOWNSTREAM(FEET) =  1514.00
  FLOW LENGTH(FEET) =   180.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.83
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.15
  PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =    9.11
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    205.00 =    1443.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    205.00 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) =   2.13
  TOTAL STREAM AREA(ACRES) =     3.04
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.15

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   206.00
  UPSTREAM ELEVATION(FEET) =   1523.00
  DOWNSTREAM ELEVATION(FEET) =   1520.00
  ELEVATION DIFFERENCE(FEET) =      3.00
  TC = 0.303*[(  206.00**3)/(     3.00)]**.2 =    5.950
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.632
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8744
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      2.16
  TOTAL AREA(ACRES) =      0.94   TOTAL RUNOFF(CFS) =      2.16

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    301.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.632
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8744
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    0.60   SUBAREA RUNOFF(CFS) =    1.38
  TOTAL AREA(ACRES) =        1.5   TOTAL RUNOFF(CFS) =       3.54
  TC(MIN.) =    5.95

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    205.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1517.00  DOWNSTREAM(FEET) =  1514.00
  FLOW LENGTH(FEET) =    65.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   5.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.38
```

```
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =        3.54
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =    6.07
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    205.00 =     271.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    205.00 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.) =    6.07
  RAINFALL INTENSITY(INCH/HR) =   2.61
  TOTAL STREAM AREA(ACRES) =     1.54
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.54

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1         6.15     9.11        2.127          3.04
     2         3.54     6.07        2.607          1.54

 *********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 **************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF       Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1         7.64     6.07       2.607
     2         9.04     9.11       2.127

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       9.04   Tc(MIN.) =    9.11
  TOTAL AREA(ACRES) =         4.6
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    205.00 =    1443.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1514.00  DOWNSTREAM(FEET) =  1512.00
  FLOW LENGTH(FEET) =   453.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.51
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =        9.04
  PIPE TRAVEL TIME(MIN.) =   0.66    Tc(MIN.) =    9.76
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    206.00 =    1896.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    206.00 TO NODE    206.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.054
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8696
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    1.55   SUBAREA RUNOFF(CFS) =    2.77
  TOTAL AREA(ACRES) =        6.1   TOTAL RUNOFF(CFS) =      11.81
  TC(MIN.) =    9.76

******************************************************************************
  FLOW PROCESS FROM NODE    206.00 TO NODE    108.00 IS CODE =  11
------------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
==============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1        11.81     9.76       2.054        6.13
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    108.00 =    1896.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1        26.00     8.74       2.172       13.43
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    108.00 =    1711.80 FEET.

 *********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 **************************************************************************

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1       36.56       8.74        2.172
     2       36.40       9.76        2.054

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      36.56   Tc(MIN.) =    8.74
  TOTAL AREA(ACRES) =       19.6

******************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    400.00 IS CODE =  41
------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1512.00  DOWNSTREAM(FEET) =  1509.00
  FLOW LENGTH(FEET) =   148.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.69
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       36.56
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =    8.85
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    400.00 =    2044.00 FEET.
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)       =       19.6  TC(MIN.) =      8.85
  PEAK FLOW RATE(CFS)     =      36.56
==============================================================================
```

==
END OF RATIONAL METHOD ANALYSIS

♀

```
____________________________________________________________________________
****************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                  (RCFC&WCD)  1978 HYDROLOGY MANUAL
       (c) Copyright 1982-2013 Advanced Engineering Software (aes)
                  (Rational Tabling Version 20.0)
               Release Date: 06/01/2013  License ID 1264

                       Analysis prepared by:





 ************************** DESCRIPTION OF STUDY **************************
* KAISER PERMANENTE MORENO VALLEY MEDICAL CENTER                            *
* ON-SITE HYDROLOGY                                                        *
* 100-YEAR STORM EVENT DEVELOPED CONDITIONS                                *
 **************************************************************************

  FILE NAME: PROPE100.DAT
  TIME/DATE OF STUDY: 13:20 01/29/2019
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.010
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.820
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.940
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.200
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.5003939
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.5001161
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.200
  SLOPE OF INTENSITY DURATION CURVE = 0.5001
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *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.*

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
```

```
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   595.00
  UPSTREAM ELEVATION(FEET) =   1552.00
  DOWNSTREAM ELEVATION(FEET) =   1534.50
  ELEVATION DIFFERENCE(FEET) =     17.50
  TC = 0.303*[(  595.00**3)/(    17.50)]**.2 =    7.901
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.308
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8784
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =     10.52
  TOTAL AREA(ACRES) =      3.62   TOTAL RUNOFF(CFS) =     10.52

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    101.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.308
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8784
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    2.09   SUBAREA RUNOFF(CFS) =    6.07
  TOTAL AREA(ACRES) =        5.7   TOTAL RUNOFF(CFS) =      16.59
  TC(MIN.) =    7.90

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1533.28  DOWNSTREAM(FEET) =  1533.14
  FLOW LENGTH(FEET) =    27.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.12
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.59
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    7.92
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     622.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1533.14  DOWNSTREAM(FEET) =  1533.00
  FLOW LENGTH(FEET) =     8.80   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.12
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.59
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    7.93
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =     630.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1530.00  DOWNSTREAM(FEET) =  1515.00
```

```
  FLOW LENGTH(FEET) =   895.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.12
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       16.59
  PIPE TRAVEL TIME(MIN.) =   0.71    Tc(MIN.) =    8.64
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =    1525.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 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.) =    8.64
  RAINFALL INTENSITY(INCH/HR) =   3.16
  TOTAL STREAM AREA(ACRES) =     5.71
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     16.59

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    106.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   409.00
  UPSTREAM ELEVATION(FEET) =   1535.50
  DOWNSTREAM ELEVATION(FEET) =   1527.50
  ELEVATION DIFFERENCE(FEET) =      8.00
  TC = 0.303*[(  409.00**3)/(     8.00)]**.2 =    7.379
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.423
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8789
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      5.93
  TOTAL AREA(ACRES) =      1.97   TOTAL RUNOFF(CFS) =      5.93

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    107.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1524.50  DOWNSTREAM(FEET) =  1520.00
  FLOW LENGTH(FEET) =   367.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.55
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =        5.93
  PIPE TRAVEL TIME(MIN.) =   0.81    Tc(MIN.) =    8.19
  LONGEST FLOWPATH FROM NODE    105.00 TO NODE    107.00 =     776.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    107.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.249
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8781
```

```
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    5.75   SUBAREA RUNOFF(CFS) =   16.40
  TOTAL AREA(ACRES) =        7.7   TOTAL RUNOFF(CFS) =      22.33
  TC(MIN.) =    8.19

****************************************************************************
  FLOW PROCESS FROM NODE    107.00 TO NODE    104.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1520.00  DOWNSTREAM(FEET) =  1515.00
  FLOW LENGTH(FEET) =    92.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  28.43
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      22.33
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    8.24
  LONGEST FLOWPATH FROM NODE    105.00 TO NODE    104.00 =     868.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 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.) =    8.24
  RAINFALL INTENSITY(INCH/HR) =   3.24
  TOTAL STREAM AREA(ACRES) =     7.72
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     22.33

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       16.59     8.64        3.164          5.71
      2       22.33     8.24        3.238          7.72

 *********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 **************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       38.16     8.24       3.238
      2       38.40     8.64       3.164

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      38.16   Tc(MIN.) =    8.24
  TOTAL AREA(ACRES) =       13.4
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =    1525.80 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    108.00 IS CODE =  41
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1515.00  DOWNSTREAM(FEET) =  1512.00
  FLOW LENGTH(FEET) =   186.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  48.59
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      38.16
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    8.31
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    108.00 =   1711.80 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 IS CODE =  10
------------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
==============================================================================

******************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   282.00
  UPSTREAM ELEVATION(FEET) =   1552.00
  DOWNSTREAM ELEVATION(FEET) =   1540.00
  ELEVATION DIFFERENCE(FEET) =     12.00
  TC = 0.303*[(  282.00**3)/(    12.00)]**.2 =    5.444
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.985
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8813
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      0.53
  TOTAL AREA(ACRES) =      0.15   TOTAL RUNOFF(CFS) =      0.53

******************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  41
------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1537.00  DOWNSTREAM(FEET) =  1533.00
  FLOW LENGTH(FEET) =   277.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   2.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.62
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.53
  PIPE TRAVEL TIME(MIN.) =   1.28    Tc(MIN.) =    6.72
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =    559.00 FEET.

******************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
------------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.586
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8797
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    0.33   SUBAREA RUNOFF(CFS) =    1.04
  TOTAL AREA(ACRES) =        0.5   TOTAL RUNOFF(CFS) =       1.57
```

```
  TC(MIN.) =    6.72

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    203.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1533.00  DOWNSTREAM(FEET) =  1523.00
  FLOW LENGTH(FEET) =   332.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   4.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.44
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.57
  PIPE TRAVEL TIME(MIN.) =   0.86    Tc(MIN.) =    7.58
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    203.00 =     891.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    203.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.377
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8787
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    2.14   SUBAREA RUNOFF(CFS) =    6.35
  TOTAL AREA(ACRES) =        2.6   TOTAL RUNOFF(CFS) =       7.92
  TC(MIN.) =    7.58

****************************************************************************
  FLOW PROCESS FROM NODE    203.00 TO NODE    204.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1523.00  DOWNSTREAM(FEET) =  1518.50
  FLOW LENGTH(FEET) =   372.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.08
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.92
  PIPE TRAVEL TIME(MIN.) =   0.61    Tc(MIN.) =    8.19
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    204.00 =    1263.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    204.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.248
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8780
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    0.42   SUBAREA RUNOFF(CFS) =    1.20
  TOTAL AREA(ACRES) =        3.0   TOTAL RUNOFF(CFS) =       9.12
  TC(MIN.) =    8.19

****************************************************************************
  FLOW PROCESS FROM NODE    204.00 TO NODE    205.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =  1518.50  DOWNSTREAM(FEET) =  1514.00
  FLOW LENGTH(FEET) =   180.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.61
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.12
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =    8.45
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    205.00 =    1443.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    205.00 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.) =    8.45
  RAINFALL INTENSITY(INCH/HR) =   3.20
  TOTAL STREAM AREA(ACRES) =     3.04
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.12

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   206.00
  UPSTREAM ELEVATION(FEET) =   1523.00
  DOWNSTREAM ELEVATION(FEET) =   1520.00
  ELEVATION DIFFERENCE(FEET) =      3.00
  TC = 0.303*[(  206.00**3)/(     3.00)]**.2 =    5.950
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.812
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8806
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      3.16
  TOTAL AREA(ACRES) =      0.94   TOTAL RUNOFF(CFS) =      3.16

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    301.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.812
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8806
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    0.60   SUBAREA RUNOFF(CFS) =    2.01
  TOTAL AREA(ACRES) =        1.5   TOTAL RUNOFF(CFS) =       5.17
  TC(MIN.) =    5.95

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    205.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1517.00  DOWNSTREAM(FEET) =  1514.00
  FLOW LENGTH(FEET) =    65.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.25
```

```
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =        5.17
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    6.06
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    205.00 =     271.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    205.00 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.) =    6.06
  RAINFALL INTENSITY(INCH/HR) =   3.78
  TOTAL STREAM AREA(ACRES) =     1.54
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.17

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1         9.12     8.45        3.198          3.04
     2         5.17     6.06        3.778          1.54

 *********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 **************************************************************************

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1        11.70     6.06       3.778
     2        13.49     8.45       3.198

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      13.49   Tc(MIN.) =    8.45
  TOTAL AREA(ACRES) =        4.6
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    205.00 =    1443.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    205.00 TO NODE    206.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1514.00  DOWNSTREAM(FEET) =  1512.00
  FLOW LENGTH(FEET) =   453.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.18
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       13.49
  PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =    8.89
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    206.00 =    1896.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    206.00 TO NODE    206.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.118
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8774
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    1.55   SUBAREA RUNOFF(CFS) =    4.24
  TOTAL AREA(ACRES) =        6.1   TOTAL RUNOFF(CFS) =      17.73
  TC(MIN.) =    8.89

****************************************************************************
  FLOW PROCESS FROM NODE    206.00 TO NODE    108.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
==============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)   (ACRE)
     1        17.73      8.89      3.118        6.13
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    108.00 =    1896.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)   (ACRE)
     1        38.16      8.31      3.226       13.43
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    108.00 =    1711.80 FEET.

 *********************************WARNING**********************************
  IN THIS COMPUTER PROGRAM, THE CONFLUENCE VALUE USED IS BASED
  ON THE RCFC&WCD FORMULA OF PLATE D-1 AS DEFAULT VALUE. THIS FORMULA
  WILL NOT NECESSARILY RESULT IN THE MAXIMUM VALUE OF PEAK FLOW.
 **************************************************************************

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)      (MIN.)   (INCH/HOUR)
     1       54.73       8.31        3.226
     2       54.62       8.89        3.118

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      54.73   Tc(MIN.) =    8.31
  TOTAL AREA(ACRES) =       19.6

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE    400.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1512.00  DOWNSTREAM(FEET) =  1509.00
  FLOW LENGTH(FEET) =   148.00   MANNING'S N =  0.013
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =  30.97
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =        54.73
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =    8.39
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    400.00 =    2044.00 FEET.
==============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =        19.6  TC(MIN.) =      8.39
  PEAK FLOW RATE(CFS)    =       54.73
==============================================================================
```

==
END OF RATIONAL METHOD ANALYSIS

♀

APPENDIX B

RCFC&WCD Reference Material

RUNOFF INDEX NUMBERS OF HYDROLOGIC SOIL-COVER COMPLEXES FOR PERVIOUS AREAS-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group A	B	C	D
NATURAL COVERS -					
Barren (Rockland, eroded and graded land)		78	86	91	93
Chaparrel, Broadleaf (Manzonita, ceanothus and scrub oak)	Poor	53	70	80	85
	Fair	40	63	75	81
	Good	31	57	71	78
Chaparrel, Narrowleaf (Chamise and redshank)	Poor	71	82	88	91
	Fair	55	72	81	86
Grass, Annual or Perennial	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Meadows or Cienegas (Areas with seasonally high water table, principal vegetation is sod forming grass)	Poor	63	77	85	88
	Fair	51	70	80	84
	Good	30	58	72	78
Open Brush (Soft wood shrubs - buckwheat, sage, etc.)	Poor	62	76	84	88
	Fair	46	66	77	83
	Good	41	63	75	81
Woodland (Coniferous or broadleaf trees predominate. Canopy density is at least 50 percent)	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	28	55	70	77
Woodland, Grass (Coniferous or broadleaf trees with canopy density from 20 to 50 percent)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
URBAN COVERS -					
Residential or Commercial Landscaping (Lawn, shrubs, etc.)	Good	32	56	69	75
Turf (Irrigated and mowed grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
AGRICULTURAL COVERS -					
Fallow (Land plowed but not tilled or seeded)		76	85	90	92

RCFC & WCD
HYDROLOGY MANUAL

RUNOFF INDEX NUMBERS FOR PERVIOUS AREAS

RUNOFF INDEX NUMBERS OF HYDROLOGIC SOIL-COVER COMPLEXES FOR PERVIOUS AREAS-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group A	B	C	D
AGRICULTURAL COVERS (cont.) -					
Legumes, Close Seeded (Alfalfa, sweetclover, timothy, etc.)	Poor	66	77	85	89
	Good	58	72	81	85
Orchards, Deciduous (Apples, apricots, pears, walnuts, etc.)		See Note 4			
Orchards, Evergreen (Citrus, avocados, etc.)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
Pasture, Dryland (Annual grasses)	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Pasture, Irrigated (Legumes and perennial grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
Row Crops (Field crops - tomatoes, sugar beets, etc.)	Poor	72	81	88	91
	Good	67	78	85	89
Small Grain (Wheat, oats, barley, etc.)	Poor	65	76	84	88
	Good	63	75	83	87
Vineyard		See Note 4			

Notes:

1. All runoff index (RI) numbers are for Antecedent Moisture Condition (AMC) II.

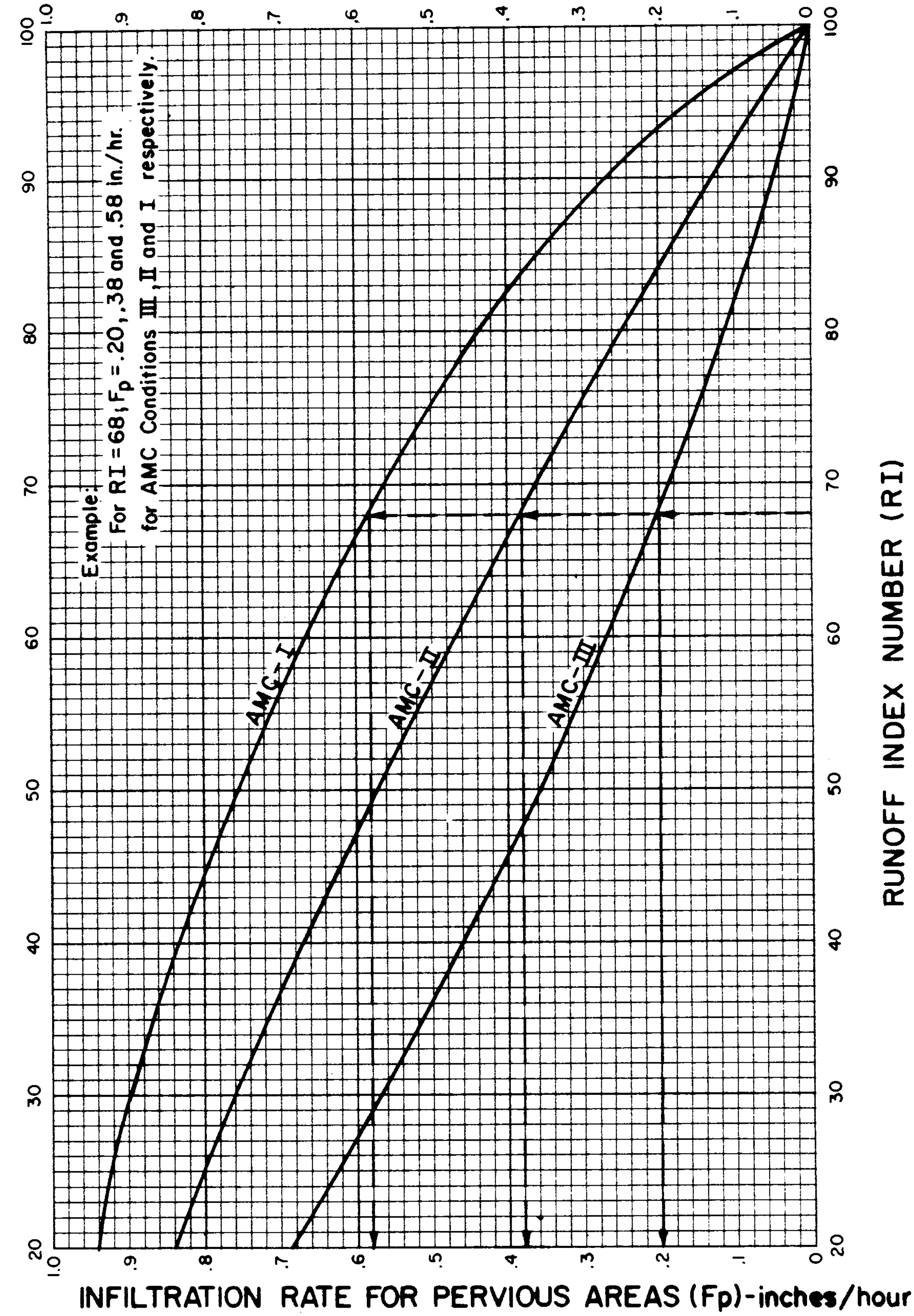
2. Quality of cover definitions:
   Poor-Heavily grazed or regularly burned areas. Less than 50 percent of the ground surface is protected by plant cover or brush and tree canopy.
   Fair-Moderate cover with 50 percent to 75 percent of the ground surface protected.
   Good-Heavy or dense cover with more than 75 percent of the ground surface protected.

3. See Plate C-2 for a detailed description of cover types.

4. Use runoff index numbers based on ground cover type. See discussion under "Cover Type Descriptions" on Plate C-2.

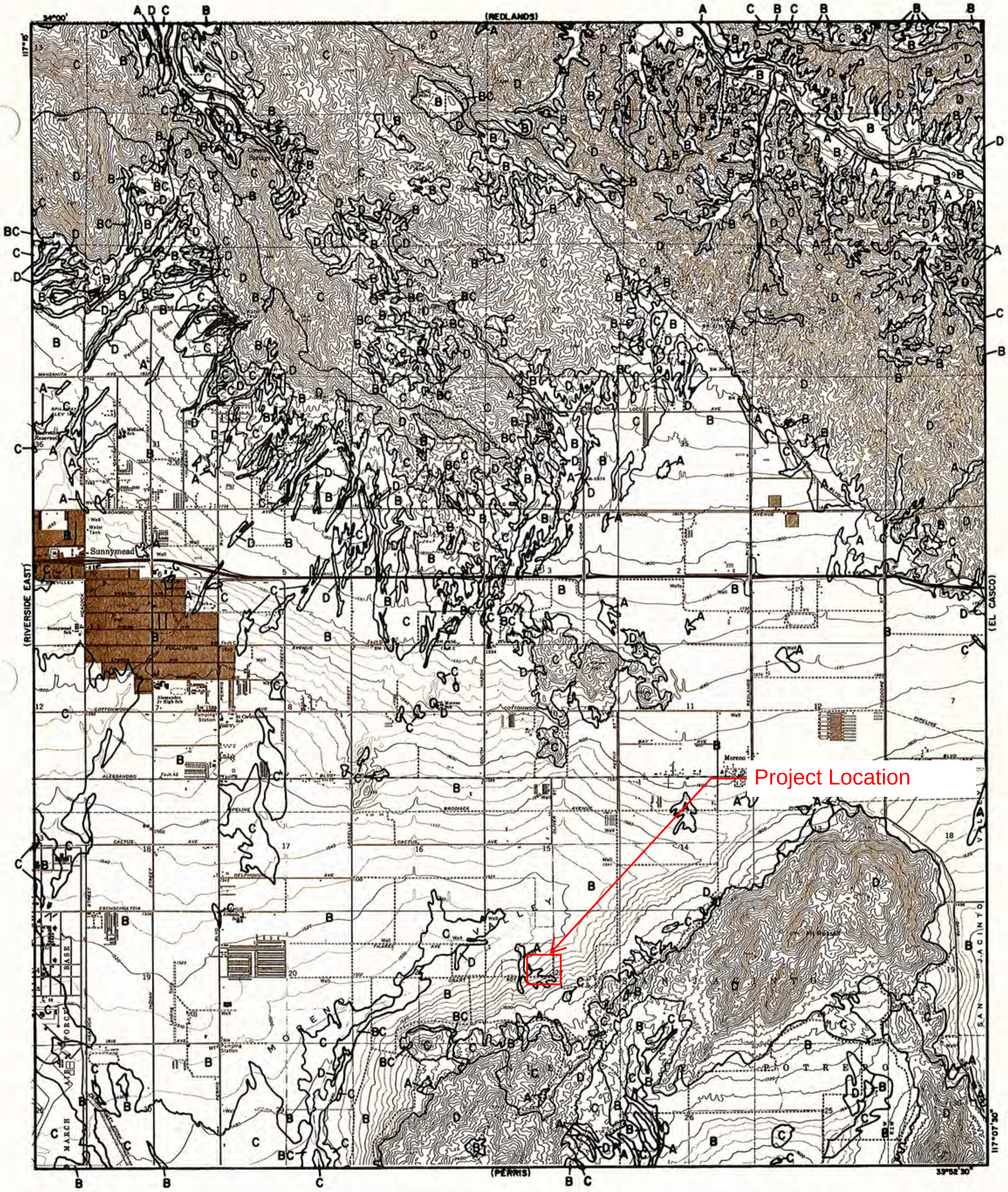
5. Reference Bibliography item 17.

NOTES:
1. R.I. Number - Infiltration relationships are derived from rainfall-runoff relationships in Bibliography item No. 36.



RCFC & WCD
HYDROLOGY MANUAL

INFILTRATION RATE FOR PERVIOUS AREAS VERSUS RUNOFF INDEX NUMBERS



LEGEND

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

RCFC & WCD

HYDROLOGY MANUAL

0 FEET 5000

HYDROLOGIC SOILS GROUP MAP FOR SUNNYMEAD

PLATE C-1.17

RCFC & WCD
HYDROLOGY MANUAL

RAINFALL INTENSITY-INCHES PER HOUR

SUNNYMEAD - MORENO			WOODCREST		
DURATION MINUTES	FREQUENCY 10 YEAR	FREQUENCY 100 YEAR	DURATION MINUTES	FREQUENCY 10 YEAR	FREQUENCY 100 YEAR
5	2.84	4.16	5	3.37	5.30
6	2.59	3.79	6	3.05	4.79
7	2.40	3.51	7	2.80	4.40
8	2.25	3.29	8	2.60	4.09
9	2.12	3.10	9	2.44	3.83
10	2.01	2.94	10	2.30	3.62
11	1.92	2.80	11	2.19	3.43
12	1.83	2.68	12	2.08	3.27
13	1.76	2.58	13	1.99	3.13
14	1.70	2.48	14	1.91	3.01
15	1.64	2.40	15	1.84	2.89
16	1.59	2.32	16	1.78	2.79
17	1.54	2.25	17	1.72	2.70
18	1.50	2.19	18	1.67	2.62
19	1.46	2.13	19	1.62	2.54
20	1.42	2.08	20	1.57	2.47
22	1.35	1.98	22	1.49	2.34
24	1.30	1.90	24	1.42	2.23
26	1.25	1.82	26	1.36	2.14
28	1.20	1.76	28	1.31	2.05
30	1.16	1.70	30	1.26	1.98
32	1.12	1.64	32	1.22	1.91
34	1.09	1.59	34	1.18	1.85
36	1.06	1.55	36	1.14	1.79
38	1.03	1.51	38	1.11	1.74
40	1.00	1.47	40	1.07	1.69
45	.95	1.39	45	1.01	1.58
50	.90	1.31	50	.95	1.49
55	.86	1.25	55	.90	1.42
60	.82	1.20	60	.86	1.35
65	.79	1.15	65	.82	1.29
70	.76	1.11	70	.79	1.24
75	.73	1.07	75	.76	1.19
80	.71	1.04	80	.73	1.15
85	.69	1.01	85	.71	1.11
SLOPE = .500			SLOPE = .550		

STANDARD
INTENSITY-DURATION
CURVES DATA

APPENDIX C

HYDRAULIC CALCULATIONS

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STORM DRAIN NETWORK

KAISER MEDICAL MORENO VALLEY

\\SANDCATFS1.BKR.MBAKERCORP.COM\VROOT\PDATA\169814\CADD\STRMWATER\PIPE SIZES.DWG JESSICA.JONES 1/30/19 12:06 pm

Node 301 West to 302 West

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01577	ft/ft
Diameter	1.50	ft
Discharge	5.23	ft³/s

Results

Normal Depth	0.66	ft
Flow Area	0.74	ft²
Wetted Perimeter	2.17	ft
Hydraulic Radius	0.34	ft
Top Width	1.49	ft
Critical Depth	0.88	ft
Percent Full	43.8	%
Critical Slope	0.00587	ft/ft
Velocity	7.03	ft/s
Velocity Head	0.77	ft
Specific Energy	1.42	ft
Froude Number	1.75	
Maximum Discharge	14.19	ft³/s
Discharge Full	13.19	ft³/s
Slope Full	0.00248	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	43.78	%
Downstream Velocity	Infinity	ft/s

Node 301 West to 302 West

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.66	ft
Critical Depth	0.88	ft
Channel Slope	0.01577	ft/ft
Critical Slope	0.00587	ft/ft

Node 302 West to Basin A

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	2.00	ft
Discharge	11.43	ft³/s

Results

Normal Depth	1.01	ft
Flow Area	1.58	ft²
Wetted Perimeter	3.15	ft
Hydraulic Radius	0.50	ft
Top Width	2.00	ft
Critical Depth	1.21	ft
Percent Full	50.3	%
Critical Slope	0.00547	ft/ft
Velocity	7.22	ft/s
Velocity Head	0.81	ft
Specific Energy	1.82	ft
Froude Number	1.43	
Maximum Discharge	24.33	ft³/s
Discharge Full	22.62	ft³/s
Slope Full	0.00255	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	50.30	%
Downstream Velocity	Infinity	ft/s

Node 302 West to Basin A

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.01	ft
Critical Depth	1.21	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00547	ft/ft

Node 103 West to Basin A

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01040	ft/ft
Diameter	2.00	ft
Discharge	13.45	ft³/s

Results

Normal Depth	1.10	ft
Flow Area	1.76	ft²
Wetted Perimeter	3.34	ft
Hydraulic Radius	0.53	ft
Top Width	1.99	ft
Critical Depth	1.32	ft
Percent Full	54.8	%
Critical Slope	0.00591	ft/ft
Velocity	7.62	ft/s
Velocity Head	0.90	ft
Specific Energy	2.00	ft
Froude Number	1.43	
Maximum Discharge	24.82	ft³/s
Discharge Full	23.07	ft³/s
Slope Full	0.00354	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	54.84	%
Downstream Velocity	Infinity	ft/s

Node 103 West to Basin A

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.10	ft
Critical Depth	1.32	ft
Channel Slope	0.01040	ft/ft
Critical Slope	0.00591	ft/ft

Node 201 East to 204 East

Project Description

Friction Method	Manning Formula		
Solve For	Normal Depth		

Input Data

Roughness Coefficient		0.013	
Channel Slope		0.02037	ft/ft
Diameter		1.50	ft
Discharge		8.36	ft³/s

Results

Normal Depth		0.80	ft
Flow Area		0.96	ft²
Wetted Perimeter		2.46	ft
Hydraulic Radius		0.39	ft
Top Width		1.50	ft
Critical Depth		1.12	ft
Percent Full		53.4	%
Critical Slope		0.00770	ft/ft
Velocity		8.72	ft/s
Velocity Head		1.18	ft
Specific Energy		1.98	ft
Froude Number		1.92	
Maximum Discharge		16.13	ft³/s
Discharge Full		14.99	ft³/s
Slope Full		0.00633	ft/ft
Flow Type	SuperCritical		

GVF Input Data

Downstream Depth		0.00	ft
Length		0.00	ft
Number Of Steps		0	

GVF Output Data

Upstream Depth		0.00	ft
Profile Description			
Profile Headloss		0.00	ft
Average End Depth Over Rise		0.00	%
Normal Depth Over Rise		53.37	%
Downstream Velocity		Infinity	ft/s

Node 201 East to 204 East

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.80	ft
Critical Depth	1.12	ft
Channel Slope	0.02037	ft/ft
Critical Slope	0.00770	ft/ft

Node 204 East to Pipe Storage

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.02251	ft/ft
Diameter	2.00	ft
Discharge	14.32	ft³/s

Results

Normal Depth	0.91	ft
Flow Area	1.38	ft²
Wetted Perimeter	2.95	ft
Hydraulic Radius	0.47	ft
Top Width	1.99	ft
Critical Depth	1.36	ft
Percent Full	45.3	%
Critical Slope	0.00613	ft/ft
Velocity	10.35	ft/s
Velocity Head	1.66	ft
Specific Energy	2.57	ft
Froude Number	2.19	
Maximum Discharge	36.51	ft³/s
Discharge Full	33.94	ft³/s
Slope Full	0.00401	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	45.33	%
Downstream Velocity	Infinity	ft/s

Node 204 East to Pipe Storage

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.91	ft
Critical Depth	1.36	ft
Channel Slope	0.02251	ft/ft
Critical Slope	0.00613	ft/ft

Node 101 East-Basin B

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	2.00	ft
Discharge	16.57	ft³/s

Results

Normal Depth	1.27	ft
Flow Area	2.11	ft²
Wetted Perimeter	3.69	ft
Hydraulic Radius	0.57	ft
Top Width	1.92	ft
Critical Depth	1.47	ft
Percent Full	63.6	%
Critical Slope	0.00679	ft/ft
Velocity	7.87	ft/s
Velocity Head	0.96	ft
Specific Energy	2.23	ft
Froude Number	1.33	
Maximum Discharge	24.33	ft³/s
Discharge Full	22.62	ft³/s
Slope Full	0.00537	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	63.56	%
Downstream Velocity	Infinity	ft/s

Node 101 East-Basin B

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.27	ft
Critical Depth	1.47	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00679	ft/ft

Basin B to Vault Connection

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.02405	ft/ft
Diameter	1.00	ft
Discharge	3.23	ft³/s

Results

Normal Depth	0.55	ft
Flow Area	0.44	ft²
Wetted Perimeter	1.67	ft
Hydraulic Radius	0.26	ft
Top Width	1.00	ft
Critical Depth	0.77	ft
Percent Full	54.9	%
Critical Slope	0.00932	ft/ft
Velocity	7.31	ft/s
Velocity Head	0.83	ft
Specific Energy	1.38	ft
Froude Number	1.93	
Maximum Discharge	5.94	ft³/s
Discharge Full	5.52	ft³/s
Slope Full	0.00822	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	54.93	%
Downstream Velocity	Infinity	ft/s

Basin B to Vault Connection

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.55	ft
Critical Depth	0.77	ft
Channel Slope	0.02405	ft/ft
Critical Slope	0.00932	ft/ft

Node 104 East to 105 East

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.02249	ft/ft
Diameter	1.50	ft
Discharge	5.59	ft³/s

Results

Normal Depth	0.62	ft
Flow Area	0.69	ft²
Wetted Perimeter	2.09	ft
Hydraulic Radius	0.33	ft
Top Width	1.48	ft
Critical Depth	0.91	ft
Percent Full	41.2	%
Critical Slope	0.00603	ft/ft
Velocity	8.15	ft/s
Velocity Head	1.03	ft
Specific Energy	1.65	ft
Froude Number	2.11	
Maximum Discharge	16.94	ft³/s
Discharge Full	15.75	ft³/s
Slope Full	0.00283	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	41.16	%
Downstream Velocity	Infinity	ft/s

Node 104 East to 105 East

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.62	ft
Critical Depth	0.91	ft
Channel Slope	0.02249	ft/ft
Critical Slope	0.00603	ft/ft

Node 105 East to Vault

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	6.18	ft³/s

Results

Normal Depth	0.83	ft
Flow Area	1.00	ft²
Wetted Perimeter	2.51	ft
Hydraulic Radius	0.40	ft
Top Width	1.49	ft
Critical Depth	0.96	ft
Percent Full	55.2	%
Critical Slope	0.00631	ft/ft
Velocity	6.18	ft/s
Velocity Head	0.59	ft
Specific Energy	1.42	ft
Froude Number	1.33	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00346	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	55.15	%
Downstream Velocity	Infinity	ft/s

Node 105 East to Vault

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.83	ft
Critical Depth	0.96	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00631	ft/ft

Node 106 East to Vault

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00500	ft/ft
Diameter	2.50	ft
Discharge	15.38	ft³/s

Results

Normal Depth	1.29	ft
Flow Area	2.57	ft²
Wetted Perimeter	4.02	ft
Hydraulic Radius	0.64	ft
Top Width	2.50	ft
Critical Depth	1.32	ft
Percent Full	51.8	%
Critical Slope	0.00465	ft/ft
Velocity	6.00	ft/s
Velocity Head	0.56	ft
Specific Energy	1.85	ft
Froude Number	1.04	
Maximum Discharge	31.20	ft³/s
Discharge Full	29.00	ft³/s
Slope Full	0.00141	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	51.78	%
Downstream Velocity	Infinity	ft/s

Node 106 East to Vault

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.29	ft
Critical Depth	1.32	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00465	ft/ft

Vault to Basin B Connection

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	2.00	ft
Discharge	16.32	ft³/s

Results

Normal Depth	1.26	ft
Flow Area	2.08	ft²
Wetted Perimeter	3.66	ft
Hydraulic Radius	0.57	ft
Top Width	1.93	ft
Critical Depth	1.46	ft
Percent Full	62.9	%
Critical Slope	0.00671	ft/ft
Velocity	7.84	ft/s
Velocity Head	0.96	ft
Specific Energy	2.21	ft
Froude Number	1.33	
Maximum Discharge	24.33	ft³/s
Discharge Full	22.62	ft³/s
Slope Full	0.00520	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	62.91	%
Downstream Velocity	Infinity	ft/s

Vault to Basin B Connection

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.26	ft
Critical Depth	1.46	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00671	ft/ft

Vault/Basin B to Storage Pipes Connection

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	2.00	ft
Discharge	19.55	ft³/s

Results

Normal Depth	1.44	ft
Flow Area	2.41	ft²
Wetted Perimeter	4.04	ft
Hydraulic Radius	0.60	ft
Top Width	1.80	ft
Critical Depth	1.59	ft
Percent Full	71.8	%
Critical Slope	0.00792	ft/ft
Velocity	8.10	ft/s
Velocity Head	1.02	ft
Specific Energy	2.46	ft
Froude Number	1.23	
Maximum Discharge	24.33	ft³/s
Discharge Full	22.62	ft³/s
Slope Full	0.00747	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	71.75	%
Downstream Velocity	Infinity	ft/s

Vault/Basin B to Storage Pipes Connection

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.44	ft
Critical Depth	1.59	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00792	ft/ft

Storage Pipes to Vault/Basin B Connection

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	2.50	ft
Discharge	21.08	ft³/s

Results

Normal Depth	1.27	ft
Flow Area	2.51	ft²
Wetted Perimeter	3.97	ft
Hydraulic Radius	0.63	ft
Top Width	2.50	ft
Critical Depth	1.56	ft
Percent Full	50.8	%
Critical Slope	0.00520	ft/ft
Velocity	8.41	ft/s
Velocity Head	1.10	ft
Specific Energy	2.37	ft
Froude Number	1.48	
Maximum Discharge	44.12	ft³/s
Discharge Full	41.01	ft³/s
Slope Full	0.00264	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	50.81	%
Downstream Velocity	Infinity	ft/s

Storage Pipes to Vault/Basin B Connection

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.27	ft
Critical Depth	1.56	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00520	ft/ft

Basin B/Vault/Storage Pipes to Node 400 East

Project Description

Friction Method	Manning Formula		
Solve For	Normal Depth		

Input Data

Roughness Coefficient		0.013	
Channel Slope		0.01000	ft/ft
Diameter		3.00	ft
Discharge		40.63	ft³/s

Results

Normal Depth		1.69	ft
Flow Area		4.11	ft²
Wetted Perimeter		5.10	ft
Hydraulic Radius		0.81	ft
Top Width		2.98	ft
Critical Depth		2.08	ft
Percent Full		56.4	%
Critical Slope		0.00546	ft/ft
Velocity		9.90	ft/s
Velocity Head		1.52	ft
Specific Energy		3.21	ft
Froude Number		1.49	
Maximum Discharge		71.74	ft³/s
Discharge Full		66.69	ft³/s
Slope Full		0.00371	ft/ft
Flow Type	SuperCritical		

GVF Input Data

Downstream Depth		0.00	ft
Length		0.00	ft
Number Of Steps		0	

GVF Output Data

Upstream Depth		0.00	ft
Profile Description			
Profile Headloss		0.00	ft
Average End Depth Over Rise		0.00	%
Normal Depth Over Rise		56.36	%
Downstream Velocity		Infinity	ft/s

Basin B/Vault/Storage Pipes to Node 400 East

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.69	ft
Critical Depth	2.08	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00546	ft/ft

Node 301 West to 302 West

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01577	ft/ft
Diameter	1.50	ft
Discharge	5.23	ft³/s

Results

Normal Depth	0.66	ft
Flow Area	0.74	ft²
Wetted Perimeter	2.17	ft
Hydraulic Radius	0.34	ft
Top Width	1.49	ft
Critical Depth	0.88	ft
Percent Full	43.8	%
Critical Slope	0.00587	ft/ft
Velocity	7.03	ft/s
Velocity Head	0.77	ft
Specific Energy	1.42	ft
Froude Number	1.75	
Maximum Discharge	14.19	ft³/s
Discharge Full	13.19	ft³/s
Slope Full	0.00248	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	43.78	%
Downstream Velocity	Infinity	ft/s

Node 301 West to 302 West

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.66	ft
Critical Depth	0.88	ft
Channel Slope	0.01577	ft/ft
Critical Slope	0.00587	ft/ft

Node 302 West to Basin A

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	2.00	ft
Discharge	11.43	ft³/s

Results

Normal Depth	1.01	ft
Flow Area	1.58	ft²
Wetted Perimeter	3.15	ft
Hydraulic Radius	0.50	ft
Top Width	2.00	ft
Critical Depth	1.21	ft
Percent Full	50.3	%
Critical Slope	0.00547	ft/ft
Velocity	7.22	ft/s
Velocity Head	0.81	ft
Specific Energy	1.82	ft
Froude Number	1.43	
Maximum Discharge	24.33	ft³/s
Discharge Full	22.62	ft³/s
Slope Full	0.00255	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	50.30	%
Downstream Velocity	Infinity	ft/s

Node 302 West to Basin A

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.01	ft
Critical Depth	1.21	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00547	ft/ft

Node 103 West to Basin A

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01040	ft/ft
Diameter	2.00	ft
Discharge	13.45	ft³/s

Results

Normal Depth	1.10	ft
Flow Area	1.76	ft²
Wetted Perimeter	3.34	ft
Hydraulic Radius	0.53	ft
Top Width	1.99	ft
Critical Depth	1.32	ft
Percent Full	54.8	%
Critical Slope	0.00591	ft/ft
Velocity	7.62	ft/s
Velocity Head	0.90	ft
Specific Energy	2.00	ft
Froude Number	1.43	
Maximum Discharge	24.82	ft³/s
Discharge Full	23.07	ft³/s
Slope Full	0.00354	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	54.84	%
Downstream Velocity	Infinity	ft/s

Node 103 West to Basin A

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.10	ft
Critical Depth	1.32	ft
Channel Slope	0.01040	ft/ft
Critical Slope	0.00591	ft/ft

Node 201 East to 204 East

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.02037	ft/ft
Diameter	1.50	ft
Discharge	8.36	ft³/s

Results

Normal Depth	0.80	ft
Flow Area	0.96	ft²
Wetted Perimeter	2.46	ft
Hydraulic Radius	0.39	ft
Top Width	1.50	ft
Critical Depth	1.12	ft
Percent Full	53.4	%
Critical Slope	0.00770	ft/ft
Velocity	8.72	ft/s
Velocity Head	1.18	ft
Specific Energy	1.98	ft
Froude Number	1.92	
Maximum Discharge	16.13	ft³/s
Discharge Full	14.99	ft³/s
Slope Full	0.00633	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	53.37	%
Downstream Velocity	Infinity	ft/s

Node 201 East to 204 East

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.80	ft
Critical Depth	1.12	ft
Channel Slope	0.02037	ft/ft
Critical Slope	0.00770	ft/ft

Node 204 East to Pipe Storage

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.02251	ft/ft
Diameter	2.00	ft
Discharge	14.32	ft^3/s

Results

Normal Depth	0.91	ft
Flow Area	1.38	ft^2
Wetted Perimeter	2.95	ft
Hydraulic Radius	0.47	ft
Top Width	1.99	ft
Critical Depth	1.36	ft
Percent Full	45.3	%
Critical Slope	0.00613	ft/ft
Velocity	10.35	ft/s
Velocity Head	1.66	ft
Specific Energy	2.57	ft
Froude Number	2.19	
Maximum Discharge	36.51	ft^3/s
Discharge Full	33.94	ft^3/s
Slope Full	0.00401	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	45.33	%
Downstream Velocity	Infinity	ft/s

Node 204 East to Pipe Storage

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.91	ft
Critical Depth	1.36	ft
Channel Slope	0.02251	ft/ft
Critical Slope	0.00613	ft/ft

Node 101 East-Basin B

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	2.00	ft
Discharge	16.57	ft³/s

Results

Normal Depth	1.27	ft
Flow Area	2.11	ft²
Wetted Perimeter	3.69	ft
Hydraulic Radius	0.57	ft
Top Width	1.92	ft
Critical Depth	1.47	ft
Percent Full	63.6	%
Critical Slope	0.00679	ft/ft
Velocity	7.87	ft/s
Velocity Head	0.96	ft
Specific Energy	2.23	ft
Froude Number	1.33	
Maximum Discharge	24.33	ft³/s
Discharge Full	22.62	ft³/s
Slope Full	0.00537	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	63.56	%
Downstream Velocity	Infinity	ft/s

Node 101 East-Basin B

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.27	ft
Critical Depth	1.47	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00679	ft/ft

Basin B to Vault Connection

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.02405	ft/ft
Diameter	1.00	ft
Discharge	3.23	ft³/s

Results

Normal Depth	0.55	ft
Flow Area	0.44	ft²
Wetted Perimeter	1.67	ft
Hydraulic Radius	0.26	ft
Top Width	1.00	ft
Critical Depth	0.77	ft
Percent Full	54.9	%
Critical Slope	0.00932	ft/ft
Velocity	7.31	ft/s
Velocity Head	0.83	ft
Specific Energy	1.38	ft
Froude Number	1.93	
Maximum Discharge	5.94	ft³/s
Discharge Full	5.52	ft³/s
Slope Full	0.00822	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	54.93	%
Downstream Velocity	Infinity	ft/s

Basin B to Vault Connection

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.55	ft
Critical Depth	0.77	ft
Channel Slope	0.02405	ft/ft
Critical Slope	0.00932	ft/ft

Node 104 East to 105 East

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.02249	ft/ft
Diameter	1.50	ft
Discharge	5.59	ft³/s

Results

Normal Depth	0.62	ft
Flow Area	0.69	ft²
Wetted Perimeter	2.09	ft
Hydraulic Radius	0.33	ft
Top Width	1.48	ft
Critical Depth	0.91	ft
Percent Full	41.2	%
Critical Slope	0.00603	ft/ft
Velocity	8.15	ft/s
Velocity Head	1.03	ft
Specific Energy	1.65	ft
Froude Number	2.11	
Maximum Discharge	16.94	ft³/s
Discharge Full	15.75	ft³/s
Slope Full	0.00283	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	41.16	%
Downstream Velocity	Infinity	ft/s

Node 104 East to 105 East

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.62	ft
Critical Depth	0.91	ft
Channel Slope	0.02249	ft/ft
Critical Slope	0.00603	ft/ft

Node 105 East to Vault

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	1.50	ft
Discharge	6.18	ft³/s

Results

Normal Depth	0.83	ft
Flow Area	1.00	ft²
Wetted Perimeter	2.51	ft
Hydraulic Radius	0.40	ft
Top Width	1.49	ft
Critical Depth	0.96	ft
Percent Full	55.2	%
Critical Slope	0.00631	ft/ft
Velocity	6.18	ft/s
Velocity Head	0.59	ft
Specific Energy	1.42	ft
Froude Number	1.33	
Maximum Discharge	11.30	ft³/s
Discharge Full	10.50	ft³/s
Slope Full	0.00346	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	55.15	%
Downstream Velocity	Infinity	ft/s

Node 105 East to Vault

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.83	ft
Critical Depth	0.96	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00631	ft/ft

Node 106 East to Vault

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.00500	ft/ft
Diameter	2.50	ft
Discharge	15.38	ft³/s

Results

Normal Depth	1.29	ft
Flow Area	2.57	ft²
Wetted Perimeter	4.02	ft
Hydraulic Radius	0.64	ft
Top Width	2.50	ft
Critical Depth	1.32	ft
Percent Full	51.8	%
Critical Slope	0.00465	ft/ft
Velocity	6.00	ft/s
Velocity Head	0.56	ft
Specific Energy	1.85	ft
Froude Number	1.04	
Maximum Discharge	31.20	ft³/s
Discharge Full	29.00	ft³/s
Slope Full	0.00141	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	51.78	%
Downstream Velocity	Infinity	ft/s

Node 106 East to Vault

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.29	ft
Critical Depth	1.32	ft
Channel Slope	0.00500	ft/ft
Critical Slope	0.00465	ft/ft

Vault to Basin B Connection

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	2.00	ft
Discharge	16.32	ft³/s

Results

Normal Depth	1.26	ft
Flow Area	2.08	ft²
Wetted Perimeter	3.66	ft
Hydraulic Radius	0.57	ft
Top Width	1.93	ft
Critical Depth	1.46	ft
Percent Full	62.9	%
Critical Slope	0.00671	ft/ft
Velocity	7.84	ft/s
Velocity Head	0.96	ft
Specific Energy	2.21	ft
Froude Number	1.33	
Maximum Discharge	24.33	ft³/s
Discharge Full	22.62	ft³/s
Slope Full	0.00520	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	62.91	%
Downstream Velocity	Infinity	ft/s

Vault to Basin B Connection

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.26	ft
Critical Depth	1.46	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00671	ft/ft

Vault/Basin B to Storage Pipes Connection

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	2.00	ft
Discharge	19.55	ft^3/s

Results

Normal Depth	1.44	ft
Flow Area	2.41	ft^2
Wetted Perimeter	4.04	ft
Hydraulic Radius	0.60	ft
Top Width	1.80	ft
Critical Depth	1.59	ft
Percent Full	71.8	%
Critical Slope	0.00792	ft/ft
Velocity	8.10	ft/s
Velocity Head	1.02	ft
Specific Energy	2.46	ft
Froude Number	1.23	
Maximum Discharge	24.33	ft^3/s
Discharge Full	22.62	ft^3/s
Slope Full	0.00747	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	71.75	%
Downstream Velocity	Infinity	ft/s

Vault/Basin B to Storage Pipes Connection

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.44	ft
Critical Depth	1.59	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00792	ft/ft

Storage Pipes to Vault/Basin B Connection

Project Description

Friction Method	Manning Formula		
Solve For	Normal Depth		

Input Data

Roughness Coefficient		0.013	
Channel Slope		0.01000	ft/ft
Diameter		2.50	ft
Discharge		21.08	ft³/s

Results

Normal Depth		1.27	ft
Flow Area		2.51	ft²
Wetted Perimeter		3.97	ft
Hydraulic Radius		0.63	ft
Top Width		2.50	ft
Critical Depth		1.56	ft
Percent Full		50.8	%
Critical Slope		0.00520	ft/ft
Velocity		8.41	ft/s
Velocity Head		1.10	ft
Specific Energy		2.37	ft
Froude Number		1.48	
Maximum Discharge		44.12	ft³/s
Discharge Full		41.01	ft³/s
Slope Full		0.00264	ft/ft
Flow Type	SuperCritical		

GVF Input Data

Downstream Depth		0.00	ft
Length		0.00	ft
Number Of Steps		0	

GVF Output Data

Upstream Depth		0.00	ft
Profile Description			
Profile Headloss		0.00	ft
Average End Depth Over Rise		0.00	%
Normal Depth Over Rise		50.81	%
Downstream Velocity		Infinity	ft/s

Storage Pipes to Vault/Basin B Connection

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.27	ft
Critical Depth	1.56	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00520	ft/ft

Basin B/Vault/Storage Pipes to Node 400 East

Project Description

Friction Method	Manning Formula	
Solve For	Normal Depth	

Input Data

Roughness Coefficient	0.013	
Channel Slope	0.01000	ft/ft
Diameter	3.00	ft
Discharge	40.63	ft³/s

Results

Normal Depth	1.69	ft
Flow Area	4.11	ft²
Wetted Perimeter	5.10	ft
Hydraulic Radius	0.81	ft
Top Width	2.98	ft
Critical Depth	2.08	ft
Percent Full	56.4	%
Critical Slope	0.00546	ft/ft
Velocity	9.90	ft/s
Velocity Head	1.52	ft
Specific Energy	3.21	ft
Froude Number	1.49	
Maximum Discharge	71.74	ft³/s
Discharge Full	66.69	ft³/s
Slope Full	0.00371	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	56.36	%
Downstream Velocity	Infinity	ft/s

Basin B/Vault/Storage Pipes to Node 400 East

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	1.69	ft
Critical Depth	2.08	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00546	ft/ft