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Deutsch/Banning Project
TRACT MAP NUMBER
35966
PRELIMINARY HYDROLOGY STUDY

March, 2008

Prepared for:

Pardee Homes
1385 Old Temescal Road
Corona, CA 92881

Revision History	
Date	Comment
March, 08	First Submittal
	Second Submittal

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65-100183

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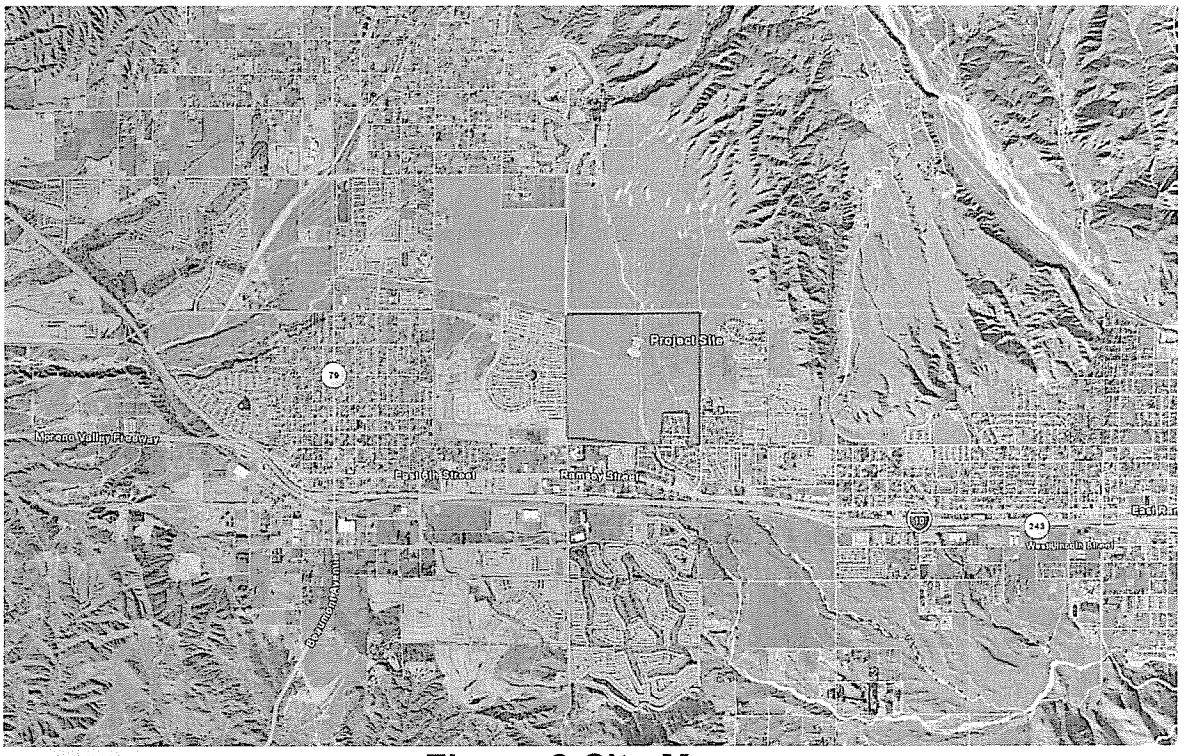
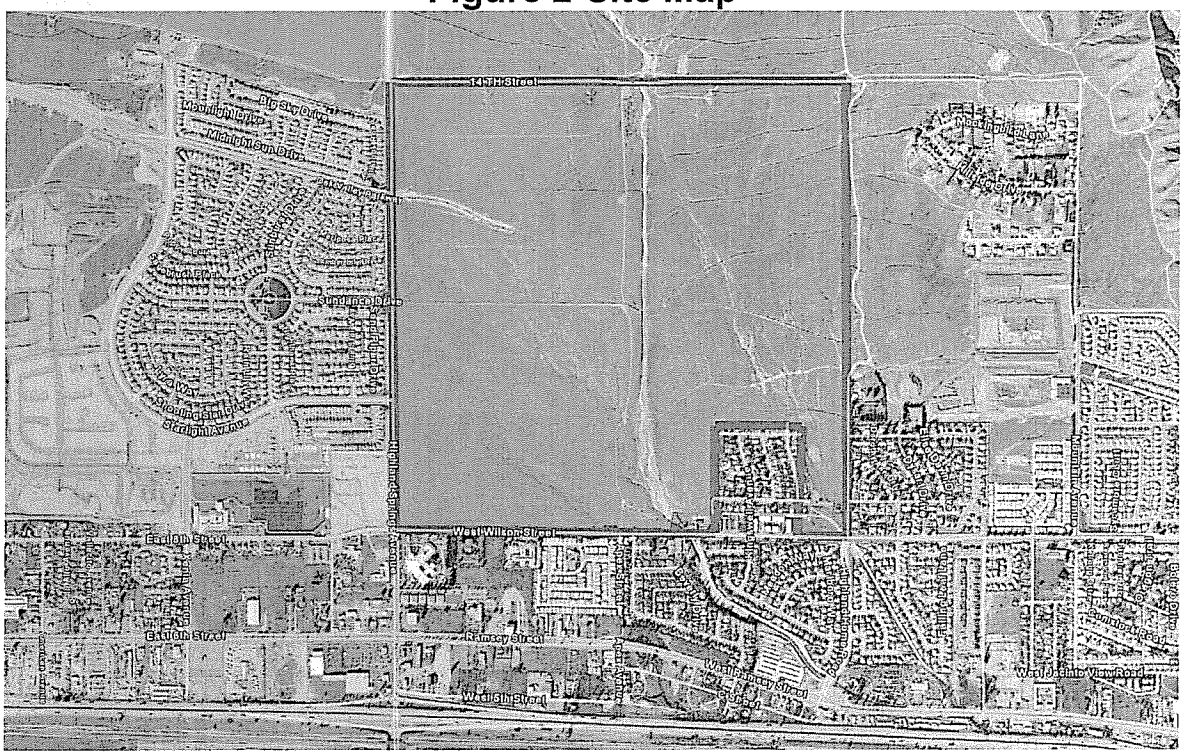


Figure 2-Site Map



Section 1 Introduction

1.1 Location and Setting

This Hydrology study is to provide the hydrologic basis for the preliminary design of backbone storm drains for the Tract No. 35966 located in the City of Banning, County of Riverside. Tract 35966 has approximately 632.5 acres. 433.9 acres of the site is single-family and condominiums housing development, commercial development and partial of golf course, drains to the Tract 35966 backbone storm drain systems. 198.6 acres of the site is either directly drains to the Smith Creek and Pershing Channel or drains to offsite storm drain facilities, which is not included in this report. The project is bounded by Highland Spring Ave to the west, Wilson Street to the south, Highland Home Road to the east, 14th Street to the north. The Vicinity and Site Map, Figure 1 and 2 shows the project location.

1.2 Project Objectives

The objectives of this study include the following:

1. Prepare hydrologic analysis of the proposed condition watershed based on land uses, drainage patterns, ground slopes, and soil types to generate the 100-year flood storm events. The hydrology computations are based on the Riverside County Flood Control and Water Conservation District Hydrology (RCFC&WCD) Manual Rational Method.

2. Develop post-project condition hydrology map identifying drainage boundaries, drainage patterns, and concentration points for onsite areas as indicated in the Tract 35966.

3. Preparation of the Hydrology Report.

The Riverside County Flood Control and Water Conservation District Hydrology Manual (April 1978) guidelines were used in performing the hydrologic analysis presented in this report. The hydrologic analysis was performed using the Advanced Engineering Software computer program developed for RCFC&WCD Hydrology Manual Rational Method (AES, 2004).

1.3 Existing Facilities

The tributary area consists predominantly of open space with fair vegetation cover, seasonally tilled land, and dirt roads.

Most of the onsite area is tributary to Smith Creek through the center of the site. The rest of the area is tributary to Pershing Channel along Highland Home Road just north of Wilson Street.

1.4 Additional Reports

The Banning/Deutch Property Backbone Drainage Study for the Butterfield Specific Plan prepared by RBF Consulting (Reference 2) analyses the entire watershed tributary to Smith Creek and Pershing Channel. This report analyses the watershed in an existing, and proposed developed conditions of the entire Banning/Deutch Property.

Reference is made to the above report since the address the pre-project condition and post-project condition of the entire watershed tributary to Smith Creek and Pershing Channel. The hydrology analysis included in this report (for Tract 35966, southern portion of Banning/Deutch Property) analyses the post-project condition on site areas in order to mitigate the flows associated with the development of the tract and to appropriately design the proposed backbone storm drain systems on Tract 35966.

Note : The 200.6 acres golf course area hydrologic analyses is not part of this report because it does not have impact to the backbone storm drain systems on Tract 35966. The Banning/Deutch Property Backbone Drainage Study covered this area in the study.

Section 2 Hydrology Analysis & Procedure

2.1 Rational Method

The Rational Method is an empirical computational procedure for developing a peak runoff/discharge for storms of a specified recurrence interval in small watersheds and was utilized in generating the hydrologic results of this study. The Rational Method is used to compute peak flow rates for watersheds less than 640 acres. The formula is:

$$Q = CIA$$

Where:

Q = Peak discharge, in cfs.
C = Runoff coefficient representing the ration of runoff depth to rainfall depth
I = The time-averaged rainfall intensity for a storm duration equal to the time of concentration, in/hr.
A = Drainage area, in acres

The basic assumption for the Rational Method is that the precipitation rate is constant and uniform over the entire watershed for the time duration such that runoff could travel from the most remote point in the watershed to the concentration point; after which time the rate of runoff does not increase. This is the time defined as the "time of concentration (T_c)." The method is based on the assumption that the peak flow rate is directly proportional to drainage area, rainfall intensity, and a runoff coefficient "C," which is related to land use and soil type.

2.2 Rational Method Guidelines

The following assumptions/guidelines were applied for use of the Rational Method:

The Rational Method hydrology includes the effects of infiltration caused by soil surface characteristics. The soils map from the RCFC&WCD Hydrology Manual indicates that the study area consists of primarily soil type "A" and "B". Hydrologic soil ratings are based on a scale of A through D, where D is the least pervious, providing the greatest runoff. The Hydrologic Soils Map, is retrieved from existing USGS, and county soils maps and saved in a GIS database, is provided under Exhibit C. For rational method the entire area was deemed to have soil type "B" as it would be the worst case scenario.

The type of vegetation, percent ground cover and the percentage of impervious surfaces also affect the infiltration rate. The post-project condition cover utilized in the calculation is ¼ acre. Most of the lots in Tract 30566 are single family developments, are ¼ acre lots; however for the analysis a higher impervious percentage lot (¼ acre lot) was used which will be more conservative by producing greater runoff. The southerly east area (Area G) is condominium development; condominium land use type was used at this area to reflect a more accurate runoff.

The runoff coefficient was developed utilizing a runoff index potential number or curve number which ranges from 1 to 98, 98 is the most impervious and the highest runoff potential. The runoff coefficients are dependent upon the percentage of pervious area, which actually allows.

The Kirpich formula as used to determine the times of concentration (Tc) for initial upstream sub-areas. This procedure is applicable for determining the time of concentration for watershed catchments where overland flow hydraulics dominates. Initial sub-areas were drawn to be less than 10 acres in size and less than 1,000 feet in length per the RCFC&WCD Hydrology Manual guidelines using this procedure.

Pipe travel times were computed based upon preliminary pipe size estimation assuming normal depth for an estimated friction slope. The travel time was calculated assuming full flow and using 30% of the total friction slope, which would result in minor losses. The friction slope was assumed to be approximately equivalent to the storm drain plans or ground slope.

Standard rainfall intensity-duration curve data and the Slope of Intensity Duration Duration Curves were obtained from the RCFC&WCD Hydrology Manual dated April 1978. RCFC&WCD has developed Standard Intensity Duration Curves for the City of Banning and a Slope of Intensity Duration Curve Map for the entire county of Riverside; the data obtained from the manual is included under Exhibits D and E.

Per criteria from the RCFC&WCD Hydrology Manual an Antecedent Moisture Condition (AMC) of 2 was utilized for the 10-year and 100-year analysis that reflects the degree of ground saturation from previous rainfall events. The AMC can range from 1 to 3, with the condition 3 being the most severe allowing for greater runoff and low infiltration.

2.3 Rational Method Calculations Computer Program

The hydrologic calculations for the post-project onsite areas were performed using a computer program developed by Advanced Engineering Software (AES) for the RCFC&WCD Hydrology Manual Rational Method. The 100-year storm events design discharge at intermediate points were computed by generating a hydrologic "link-node" model which divides the area into drainage subareas, each tributary to a concentration point or hydrologic "node" point determined by the proposed terrain as shown on the Hydrology Map, Exhibit A.

2.4 Hydrology Summary

A hydrology results summary for the proposed condition hydrology is shown on the Summary Table provided with the Hydrology Map, Exhibit A. The detailed analysis of the AES Rational Method hydrology is included in Appendix A for onsite areas post-project condition.

Section 3 Hydraulics

3.1 Storm Drain Design Criteria

The proposed backbone storm drain system was analyzed to convey the 100-year storm event.

The following parameters were utilized for the design of the storm drain system:

1. Manning's "n" value of 0.013 for reinforced concrete pipe (RCP) was used in the calculations.

2. The minimum pipe size is 18-inches for main line storm drain systems.

3. The mainline storm drain system will be designed to convey the 100-year flood event flowrate for the proposed condition.

3.2 Proposed Storm Drain Systems

Smith Creek and Pershing Channel
Smith Creek and Pershing Channel are the major backbone storm drain system for the entire site. The Smith Creek Hydrology and Hydraulics analysis is on separated report as mentioned on section 1.4. This report is study on the storm drain facilities, connecting to the Smith Creek and Perching Channel, are Pipe 1 to Pipe 19.

Pipe 1 to Pipe 19

Since the mainline storm drain system will be designed to convey the 100-year flood event flowrates for the proposed condition. The following table compares the estimated flowrates and pipes capacities at nodes of interests to demonstrate that the design of the storm drain meets the above criteria:

Pipe ID	Node	Estimated Flowrate ft^3/sec	Pipe Size	Pipe Capacities ft^3/sec
		Q_{100}		
1	302-304	59.2	36 in	74.0
2	304-306	68.1	36 in	84.5
3	*308	153.8	48 in	160.0
4	406-408	64.6	30 in	65.1
5	408-414	131.1	45 in	147.1
6	822-414	11.9	24 in	16.2
7	414-416	170.7	60 in	186.2

Pipe ID	Node	Estimated Flowrate ft^3/sec	Pipe Size	Pipe Capacities
		Q_{100}		
8	416-250	170.7	36 in	202.7
9	164-140	20.7	18 in	24.5
10	714-716	5.3	18 in	21.0
11	716-718	10.6	18 in	21.0
12	718-720	15.5	18 in	20.81
13	720-722	18.8	18 in	20.81
14	722-712	22.7	24 in	28.6
15	124-104	59.5	36 in	63.6
16	118-105	10.9	18 in	16.3
17	246-241	51.0	30 in	67.0
18	520-522	106.7	36 in	140.6
19	*604	57.5	24 in	57.5
20	*712	129	36 in	139.5
21	230-240	37.4	18 in	41.6

* concentration point

The FlowMaster Computer Program, based upon the Federal Highway Administration HEC-22 Design Manual, developed by Haestad Methods Inc was utilized to estimate the storm drain pipe sizes. Information regarding the pipes capacities is included in Appendix B. Exhibit B Proposed Storm Drain Sizing shows the location of the backbone drainage facilities and the sizing.

Section 4 Results

4.1 Hydrology Results

The post-project condition hydrology analysis evaluates the runoff emanating from the onsite areas. Table 1 tabulates the flowrates resulting from the post-project condition analysis performed for the nodal points of interests as shown on the Hydrology Map, Exhibit A:

Table 1 – Tract 35966 Post-project Hydrology Results

		Post-project Condition	
Area Designation	**Concentration Point**	**Area Acres**	**Q_{100} ft^3/sec**
A	104	27.44	59.5
B	105	3.68	10.9
C	308	70.6	153.8
D	250	89.72	170.7
E	522	57.48	106.7
F	604	31.31	129.0
G	712	71.10	18.4
H	822	12.92	11.9
I	140	17.48	20.7
J	240	17.76	37.4
K	241	27.67	51.0

A future storm drain plan and hydraulic analysis will mitigate the flowrate estimated by this hydrology report.

Section 5 References

5.1 Technical References

1. RBF Consulting, *Banning/Deutch Property Backbone Drainage Study, Dated Feb, 2006.*
2. Riverside County Flood Control and Water Conservation District (RCFC&WCD), *Hydrology Manual,* 1978.

TECHNICAL APPENDIX

APPENDIX A

Rational Method Hydrology

100-Yr Post-Project Condition

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**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                    (RCFC&WCD)  1978 HYDROLOGY MANUAL
         (c) Copyright 1982-2004 Advanced Engineering Software (aes)
                    (Rational Tabling Version 6.0D)
                Release Date: 01/01/2004  License ID 1264

                        Analysis prepared by:

                            RBF Consulting
                          14725 Alton Parkway
                        Irvine, California  92618


 ************************* DESCRIPTION OF STUDY *************************
* Deutsch Banning Project      Project No : 65-100183                    *
* Hydrology for A-Map, 100 years strom event                             *
* Date : 2008-03-25      By: AC                                          *
 **************************************************************************

  FILE NAME: AMAP100.DAT
  TIME/DATE OF STUDY: 11:12 03/26/2008
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  2-YEAR, 1-HOUR PRECIPITATION(INCH) =  0.570
  100-YEAR, 1-HOUR PRECIPITATION(INCH) =  1.300
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.300
  SLOPE OF INTENSITY DURATION CURVE = 0.5300
  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
  2   18.0      9.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0160
  3   20.0     12.0    0.015/0.050/0.020   0.50    1.50 0.0313 0.125 0.0160

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth = -0.17 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  8.0 (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    102.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
          ASSUMED INITIAL SUBAREA UNIFORM
          DEVELOPMENT IS SINGLE FAMILY (1/4 ACRE)
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   454.00
  UPSTREAM ELEVATION(FEET) =   2691.50
  DOWNSTREAM ELEVATION(FEET) =   2681.50
  ELEVATION DIFFERENCE(FEET) =     10.00
  TC = 0.393*[(  454.00**3)/(    10.00)]**.2 =    9.732
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.409
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7942
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      8.93
```

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 TOTAL AREA(ACRES) =      3.30   TOTAL RUNOFF(CFS) =      8.93
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 FLOW PROCESS FROM NODE    102.00 TO NODE    124.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 2681.50  DOWNSTREAM ELEVATION(FEET) = 2656.00
 STREET LENGTH(FEET) =  1145.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0130

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      16.40
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.41
   HALFSTREET FLOOD WIDTH(FEET) =   14.24
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.82
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.57
 STREET FLOW TRAVEL TIME(MIN.) =   4.99   Tc(MIN.) =  14.72
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.737
 SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7754
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =    6.99      SUBAREA RUNOFF(CFS) =   14.84
 TOTAL AREA(ACRES) =     10.29        PEAK FLOW RATE(CFS) =      23.77

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.46   HALFSTREET FLOOD WIDTH(FEET) =  16.49
 FLOW VELOCITY(FEET/SEC.) =  4.19   DEPTH*VELOCITY(FT*FT/SEC.) =   1.91
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    124.00 =  1599.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    124.00 TO NODE    124.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  14.72
 RAINFALL INTENSITY(INCH/HR) =   2.74
 TOTAL STREAM AREA(ACRES) =    10.29
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     23.77
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 FLOW PROCESS FROM NODE    120.00 TO NODE    122.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
        ASSUMED INITIAL SUBAREA UNIFORM
        DEVELOPMENT IS SINGLE FAMILY (1/4 ACRE)
 TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   605.00
 UPSTREAM ELEVATION(FEET) =   2681.00
 DOWNSTREAM ELEVATION(FEET) =   2669.00
 ELEVATION DIFFERENCE(FEET) =     12.00
 TC = 0.393*[(  605.00**3)/(    12.00)]**.2 =   11.147
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.172
 SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7883
 SOIL CLASSIFICATION IS "B"
 SUBAREA RUNOFF(CFS) =     11.18
 TOTAL AREA(ACRES) =      4.47   TOTAL RUNOFF(CFS) =     11.18
++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
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```
 FLOW PROCESS FROM NODE    122.00 TO NODE    124.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 2669.00  DOWNSTREAM ELEVATION(FEET) = 2656.00
 STREET LENGTH(FEET) =   847.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0130

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      17.78
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.44
   HALFSTREET FLOOD WIDTH(FEET) =   15.79
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.41
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.51
 STREET FLOW TRAVEL TIME(MIN.) =   4.14   Tc(MIN.) =  15.29
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.683
 SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7736
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =    6.35      SUBAREA RUNOFF(CFS) =   13.18
 TOTAL AREA(ACRES) =     10.82        PEAK FLOW RATE(CFS) =      24.36

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.48   HALFSTREET FLOOD WIDTH(FEET) =  17.89
 FLOW VELOCITY(FEET/SEC.) =  3.67   DEPTH*VELOCITY(FT*FT/SEC.) =   1.78
 LONGEST FLOWPATH FROM NODE    120.00 TO NODE    124.00 =  1452.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    124.00 TO NODE    124.00 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.) =  15.29
 RAINFALL INTENSITY(INCH/HR) =   2.68
 TOTAL STREAM AREA(ACRES) =    10.82
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     24.36

 ** CONFLUENCE DATA **
 STREAM      RUNOFF      Tc       INTENSITY      AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)    (ACRE)
     1        23.77     14.72        2.737         10.29
     2        24.36     15.29        2.683         10.82

 ***********************************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        47.23     14.72        2.737
     2        47.66     15.29        2.683

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
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```
 PEAK FLOW RATE(CFS) =      47.66   Tc(MIN.) =    15.29
 TOTAL AREA(ACRES) =      21.11
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    124.00 =  1599.00 FEET.
****************************************************************************
 FLOW PROCESS FROM NODE    124.00 TO NODE    104.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 2656.00  DOWNSTREAM ELEVATION(FEET) = 2640.50
 STREET LENGTH(FEET) =   908.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2                    (A-5)
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0130

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      53.57
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.58
   HALFSTREET FLOOD WIDTH(FEET) =    22.23
   AVERAGE FLOW VELOCITY(FEET/SEC.) =     5.05
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =     2.95
 STREET FLOW TRAVEL TIME(MIN.) =    3.00   Tc(MIN.) =  18.29
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.440
 SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7648
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =     6.33       SUBAREA RUNOFF(CFS) =    11.81
 TOTAL AREA(ACRES) =     27.44         PEAK FLOW RATE(CFS) =      59.47

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.60   HALFSTREET FLOOD WIDTH(FEET) =  23.14
 FLOW VELOCITY(FEET/SEC.) =  5.20   DEPTH*VELOCITY(FT*FT/SEC.) =   3.13
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =  2507.00 FEET.
****************************************************************************
 FLOW PROCESS FROM NODE    114.00 TO NODE    116.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
        ASSUMED INITIAL SUBAREA UNIFORM
        DEVELOPMENT IS SINGLE FAMILY (1/4 ACRE)
 TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2                              (B-1)
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   447.00
 UPSTREAM ELEVATION(FEET) =   2686.50
 DOWNSTREAM ELEVATION(FEET) =    2666.50
 ELEVATION DIFFERENCE(FEET) =      20.00
 TC = 0.393*[(  447.00**3)/(    20.00)]**.2 =     8.393
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.687
 SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .8004
 SOIL CLASSIFICATION IS "B"
 SUBAREA RUNOFF(CFS) =       5.78
 TOTAL AREA(ACRES) =       1.96   TOTAL RUNOFF(CFS) =      5.78
****************************************************************************
 FLOW PROCESS FROM NODE    116.00 TO NODE    118.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<                               (B-2)
============================================================================
 UPSTREAM ELEVATION(FEET) = 2666.50  DOWNSTREAM ELEVATION(FEET) = 2646.70
 STREET LENGTH(FEET) =      1.72   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00
```

```
 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =    9.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0130

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.32
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.16
   HALFSTREET FLOOD WIDTH(FEET) =    1.50
   AVERAGE FLOW VELOCITY(FEET/SEC.) =   59.97
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    9.37
 STREET FLOW TRAVEL TIME(MIN.) =   0.00   Tc(MIN.) =   8.39
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.687
 SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .8004
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =    1.72      SUBAREA RUNOFF(CFS) =    5.08
 TOTAL AREA(ACRES) =      3.68        PEAK FLOW RATE(CFS) =      10.86

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.16   HALFSTREET FLOOD WIDTH(FEET) =   1.50
 FLOW VELOCITY(FEET/SEC.) = 59.97   DEPTH*VELOCITY(FT*FT/SEC.) =   9.37
 LONGEST FLOWPATH FROM NODE    114.00 TO NODE    118.00 =   448.72 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    118.00 TO NODE    105.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  2646.70  DOWNSTREAM(FEET) =  2640.50
 FLOW LENGTH(FEET) =   244.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.68
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     10.86
 PIPE TRAVEL TIME(MIN.) =   0.42    Tc(MIN.) =   8.81
 LONGEST FLOWPATH FROM NODE    114.00 TO NODE    105.00 =   692.72 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    160.00 TO NODE    162.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
        ASSUMED INITIAL SUBAREA UNIFORM
        DEVELOPMENT IS: UNDEVELOPED WITH GOOD COVER
 TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   803.00
 UPSTREAM ELEVATION(FEET) =   2640.00
 DOWNSTREAM ELEVATION(FEET) =   2627.20
 ELEVATION DIFFERENCE(FEET) =     12.80
 TC = 0.937*[(  803.00**3)/(    12.80)]**.2 =   31.140
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.840
 UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .5735
 SOIL CLASSIFICATION IS "B"
 SUBAREA RUNOFF(CFS) =      4.80
 TOTAL AREA(ACRES) =      4.55   TOTAL RUNOFF(CFS) =      4.80

****************************************************************************
 FLOW PROCESS FROM NODE    162.00 TO NODE    164.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 2627.20  DOWNSTREAM ELEVATION(FEET) = 2609.00
 STREET LENGTH(FEET) =  1084.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00
```

I-1

I-2

```
 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =    9.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =    0.0160
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =    0.0130

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.72
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.40
   HALFSTREET FLOOD WIDTH(FEET) =   13.61
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.23
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.29
 STREET FLOW TRAVEL TIME(MIN.) =   5.59   Tc(MIN.) =  36.73
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.686
 SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7275
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =    12.93      SUBAREA RUNOFF(CFS) =   15.86
 TOTAL AREA(ACRES) =     17.48        PEAK FLOW RATE(CFS) =      20.66

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.46   HALFSTREET FLOOD WIDTH(FEET) =  16.49
 FLOW VELOCITY(FEET/SEC.) =  3.64   DEPTH*VELOCITY(FT*FT/SEC.) =   1.66
 LONGEST FLOWPATH FROM NODE    160.00 TO NODE    164.00 =  1887.00 FEET.

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

 FLOW PROCESS FROM NODE    164.00 TO NODE    140.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  2609.00  DOWNSTREAM(FEET) =  2597.00
 FLOW LENGTH(FEET) =   220.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  14.88
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     20.66
 PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =  36.98
 LONGEST FLOWPATH FROM NODE    160.00 TO NODE    140.00 =  2107.00 FEET.

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

 FLOW PROCESS FROM NODE    212.00 TO NODE    214.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
        ASSUMED INITIAL SUBAREA UNIFORM
        DEVELOPMENT IS SINGLE FAMILY (1/4 ACRE)
 TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   871.00
 UPSTREAM ELEVATION(FEET) =   2686.50
 DOWNSTREAM ELEVATION(FEET) =   2656.50
 ELEVATION DIFFERENCE(FEET) =     30.00
 TC = 0.393*[(  871.00**3)/(    30.00)]**.2 =   11.549
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.113
 SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7867
 SOIL CLASSIFICATION IS "B"
 SUBAREA RUNOFF(CFS) =      7.64
 TOTAL AREA(ACRES) =      3.12   TOTAL RUNOFF(CFS) =      7.64

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

 FLOW PROCESS FROM NODE    214.00 TO NODE    230.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 2656.50  DOWNSTREAM ELEVATION(FEET) = 2638.20
 STREET LENGTH(FEET) =   987.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00
```

J-1

J-2

```
 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =    9.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0130

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      22.62
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.46
   HALFSTREET FLOOD WIDTH(FEET) =   16.77
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.86
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.78
 STREET FLOW TRAVEL TIME(MIN.) =   4.26   Tc(MIN.) =  15.81
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.636
 SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7720
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =   14.64      SUBAREA RUNOFF(CFS) =   29.79
 TOTAL AREA(ACRES) =     17.76        PEAK FLOW RATE(CFS) =      37.43

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.53   HALFSTREET FLOOD WIDTH(FEET) =  19.30
 FLOW VELOCITY(FEET/SEC.) =  4.58   DEPTH*VELOCITY(FT*FT/SEC.) =   2.41
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L =  987.0 FT WITH ELEVATION-DROP =  18.3 FT, IS   32.4 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    230.00
 LONGEST FLOWPATH FROM NODE    212.00 TO NODE    230.00 =  1858.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    230.00 TO NODE    240.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  2638.20  DOWNSTREAM(FEET) =  2625.00
 FLOW LENGTH(FEET) =   110.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  23.55
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     37.43
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =  15.89
 LONGEST FLOWPATH FROM NODE    212.00 TO NODE    240.00 =  1968.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    242.00 TO NODE    244.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
        ASSUMED INITIAL SUBAREA UNIFORM
        DEVELOPMENT IS SINGLE FAMILY (1/4 ACRE)
 TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   947.00
 UPSTREAM ELEVATION(FEET) =   2683.30
 DOWNSTREAM ELEVATION(FEET) =   2669.00
 ELEVATION DIFFERENCE(FEET) =     14.30
 TC = 0.393*[(  947.00**3)/(    14.30)]**.2 =   14.083
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.803
 SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7776
 SOIL CLASSIFICATION IS "B"
 SUBAREA RUNOFF(CFS) =      6.69
 TOTAL AREA(ACRES) =      3.07   TOTAL RUNOFF(CFS) =      6.69

****************************************************************************
 FLOW PROCESS FROM NODE    244.00 TO NODE    246.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 2669.00  DOWNSTREAM ELEVATION(FEET) = 2642.50
```

(K-1)

(K-2)

```
  STREET LENGTH(FEET) =  1358.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0130

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      29.03
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.49
    HALFSTREET FLOOD WIDTH(FEET) =   18.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.23
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.07
  STREET FLOW TRAVEL TIME(MIN.) =   5.36   Tc(MIN.) =  19.44
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.362
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7618
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =   24.60      SUBAREA RUNOFF(CFS) =   44.27
  TOTAL AREA(ACRES) =     27.67        PEAK FLOW RATE(CFS) =      50.96

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.57   HALFSTREET FLOOD WIDTH(FEET) =  21.31
  FLOW VELOCITY(FEET/SEC.) =  5.19   DEPTH*VELOCITY(FT*FT/SEC.) =   2.94
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L = 1358.0 FT WITH ELEVATION-DROP =  26.5 FT, IS   50.7 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    246.00
  LONGEST FLOWPATH FROM NODE    242.00 TO NODE    246.00 =  2305.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    246.00 TO NODE    241.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2642.50  DOWNSTREAM(FEET) =  2625.00
  FLOW LENGTH(FEET) =   655.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.40
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     50.96
  PIPE TRAVEL TIME(MIN.) =   0.76    Tc(MIN.) =  20.20
  LONGEST FLOWPATH FROM NODE    242.00 TO NODE    241.00 =  2960.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    302.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS SINGLE FAMILY (1/4 ACRE)
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   823.00
  UPSTREAM ELEVATION(FEET) =   2668.00
  DOWNSTREAM ELEVATION(FEET) =   2653.00
  ELEVATION DIFFERENCE(FEET) =     15.00
  TC = 0.393*[(  823.00**3)/(    15.00)]**.2 =   12.822
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.945
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7819
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      4.88
  TOTAL AREA(ACRES) =      2.12   TOTAL RUNOFF(CFS) =      4.88

****************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    303.00 IS CODE =  61
----------------------------------------------------------------------------
```

C-1

C-2

```
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 2653.00  DOWNSTREAM ELEVATION(FEET) = 2640.40
  STREET LENGTH(FEET) =   845.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 32.00

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

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.46
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
    HALFSTREET FLOOD WIDTH(FEET) =   11.16
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.74
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.96
  STREET FLOW TRAVEL TIME(MIN.) =   5.14   Tc(MIN.) =  17.97
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.463
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7657
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =     2.73      SUBAREA RUNOFF(CFS) =     5.15
  TOTAL AREA(ACRES) =      4.85        PEAK FLOW RATE(CFS) =      10.03

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  12.63
  FLOW VELOCITY(FEET/SEC.) =  2.93   DEPTH*VELOCITY(FT*FT/SEC.) =   1.11
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =  1668.00 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.) =  17.97
  RAINFALL INTENSITY(INCH/HR) =   2.46
  TOTAL STREAM AREA(ACRES) =     4.85
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.03

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    342.00 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) =   430.00
  UPSTREAM ELEVATION(FEET) =   2667.00
  DOWNSTREAM ELEVATION(FEET) =   2656.00
  ELEVATION DIFFERENCE(FEET) =     11.00
  TC = 0.303*[(  430.00**3)/(    11.00)]**.2 =    7.135
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.019
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8814
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =     13.03
  TOTAL AREA(ACRES) =      3.68   TOTAL RUNOFF(CFS) =     13.03

****************************************************************************
  FLOW PROCESS FROM NODE    342.00 TO NODE    303.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
```

C-3

C-4

```
 ELEVATION DATA: UPSTREAM(FEET) =   2656.00  DOWNSTREAM(FEET) =   2640.40
 CHANNEL LENGTH THRU SUBAREA(FEET) =   727.00   CHANNEL SLOPE =  0.0215
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0215 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =     13.03
 FLOW VELOCITY(FEET/SEC) =   1.93 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   6.28   Tc(MIN.) =  13.42
 LONGEST FLOWPATH FROM NODE    340.00 TO NODE    303.00 =  1157.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    303.00 TO NODE    303.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.875
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8760
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =     8.78   SUBAREA RUNOFF(CFS) =   22.12
 TOTAL AREA(ACRES) =     12.46   TOTAL RUNOFF(CFS) =   35.15
 TC(MIN.) =  13.42

****************************************************************************
 FLOW PROCESS FROM NODE    303.00 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.) =  13.42
 RAINFALL INTENSITY(INCH/HR) =   2.88
 TOTAL STREAM AREA(ACRES) =    12.46
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     35.15

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
     1        10.03     17.97         2.463          4.85
     2        35.15     13.42         2.875         12.46

 ***********************************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        42.64     13.42        2.875
     2        40.14     17.97        2.463

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     42.64   Tc(MIN.) =   13.42
 TOTAL AREA(ACRES) =     17.31
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    303.00 =  1668.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    303.00 TO NODE    304.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 2640.40  DOWNSTREAM ELEVATION(FEET) = 2628.00
 STREET LENGTH(FEET) =   884.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 32.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  16.00
```

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

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      50.92
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.61
    HALFSTREET FLOOD WIDTH(FEET) =   29.38
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.12
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.50
  STREET FLOW TRAVEL TIME(MIN.) =   3.58   Tc(MIN.) =  16.99
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.537
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7685
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    8.49      SUBAREA RUNOFF(CFS) =   16.55
  TOTAL AREA(ACRES) =     25.80        PEAK FLOW RATE(CFS) =      59.19

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.63   HALFSTREET FLOOD WIDTH(FEET) =  32.13
  FLOW VELOCITY(FEET/SEC.) =  4.21   DEPTH*VELOCITY(FT*FT/SEC.) =   2.67
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    304.00 =  2552.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    304.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  16.99
  RAINFALL INTENSITY(INCH/HR) =   2.54
  TOTAL STREAM AREA(ACRES) =    25.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     59.19

****************************************************************************
  FLOW PROCESS FROM NODE    312.00 TO NODE    304.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
        ASSUMED INITIAL SUBAREA UNIFORM
        DEVELOPMENT IS SINGLE FAMILY (1/4 ACRE)
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   982.00
  UPSTREAM ELEVATION(FEET) =   2639.00
  DOWNSTREAM ELEVATION(FEET) =   2628.00
  ELEVATION DIFFERENCE(FEET) =     11.00
  TC = 0.393*[(  982.00**3)/(    11.00)]**.2 =   15.168
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.694
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7740
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      6.92
  TOTAL AREA(ACRES) =      3.32   TOTAL RUNOFF(CFS) =      6.92

****************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    304.00 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.) =  15.17
  RAINFALL INTENSITY(INCH/HR) =   2.69
  TOTAL STREAM AREA(ACRES) =     3.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.92

  ** CONFLUENCE DATA **
```

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```
 STREAM      RUNOFF      Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)   (INCH/HOUR)     (ACRE)
     1        59.19     16.99        2.537         25.80
     2         6.92     15.17        2.694          3.32

 ***********************************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        59.77     15.17        2.694
      2        65.71     16.99        2.537

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     65.71   Tc(MIN.) =   16.99
  TOTAL AREA(ACRES) =     29.12
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    304.00 =  2552.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    306.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 2628.00  DOWNSTREAM ELEVATION(FEET) = 2618.00
  STREET LENGTH(FEET) =   582.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 32.00

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

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      66.92
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.64
    HALFSTREET FLOOD WIDTH(FEET) =   32.50
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.68
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.99
  STREET FLOW TRAVEL TIME(MIN.) =   2.07   Tc(MIN.) =  19.06
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.387
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7627
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    1.32      SUBAREA RUNOFF(CFS) =    2.40
  TOTAL AREA(ACRES) =     30.44        PEAK FLOW RATE(CFS) =      68.12

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.64   HALFSTREET FLOOD WIDTH(FEET) =  32.88
  FLOW VELOCITY(FEET/SEC.) =  4.69   DEPTH*VELOCITY(FT*FT/SEC.) =   3.01
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    306.00 =  3134.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    306.00 TO NODE    306.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  19.06
  RAINFALL INTENSITY(INCH/HR) =   2.39
```

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```
 TOTAL STREAM AREA(ACRES) =    30.44
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     68.12

****************************************************************************
 FLOW PROCESS FROM NODE    310.00 TO NODE    314.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
        ASSUMED INITIAL SUBAREA UNIFORM
        DEVELOPMENT IS SINGLE FAMILY (1/4 ACRE)
 TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   810.00
 UPSTREAM ELEVATION(FEET) =   2646.00
 DOWNSTREAM ELEVATION(FEET) =   2632.00
 ELEVATION DIFFERENCE(FEET) =     14.00
 TC = 0.393*[(  810.00**3)/(    14.00)]**.2 =   12.877
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.939
 SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7817
 SOIL CLASSIFICATION IS "B"
 SUBAREA RUNOFF(CFS) =      7.31
 TOTAL AREA(ACRES) =      3.18   TOTAL RUNOFF(CFS) =      7.31

****************************************************************************
 FLOW PROCESS FROM NODE    314.00 TO NODE    306.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 2632.00  DOWNSTREAM ELEVATION(FEET) = 2618.00
 STREET LENGTH(FEET) =  1322.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0130

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      17.73
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.47
   HALFSTREET FLOOD WIDTH(FEET) =   16.98
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.95
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.38
 STREET FLOW TRAVEL TIME(MIN.) =   7.46   Tc(MIN.) =  20.34
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.307
 SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7595
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =   11.80      SUBAREA RUNOFF(CFS) =   20.67
 TOTAL AREA(ACRES) =     14.98        PEAK FLOW RATE(CFS) =      27.98

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.52   HALFSTREET FLOOD WIDTH(FEET) =  19.24
 FLOW VELOCITY(FEET/SEC.) =  3.44   DEPTH*VELOCITY(FT*FT/SEC.) =   1.81
 LONGEST FLOWPATH FROM NODE    310.00 TO NODE    306.00 =  2132.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    306.00 TO NODE    306.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  20.34
 RAINFALL INTENSITY(INCH/HR) =   2.31
 TOTAL STREAM AREA(ACRES) =    14.98
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     27.98
```

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```
 FLOW PROCESS FROM NODE    324.00 TO NODE    326.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
        ASSUMED INITIAL SUBAREA UNIFORM
        DEVELOPMENT IS SINGLE FAMILY (1/4 ACRE)
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   754.00
  UPSTREAM ELEVATION(FEET) =   2641.00
  DOWNSTREAM ELEVATION(FEET) =   2626.00
  ELEVATION DIFFERENCE(FEET) =     15.00
  TC = 0.393*[(  754.00**3)/(    15.00)]**.2 =   12.166
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.029
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7843
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      5.20
  TOTAL AREA(ACRES) =      2.19   TOTAL RUNOFF(CFS) =      5.20

 FLOW PROCESS FROM NODE    326.00 TO NODE    306.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 2626.00  DOWNSTREAM ELEVATION(FEET) = 2618.00
  STREET LENGTH(FEET) =   682.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0130

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.04
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.43
    HALFSTREET FLOOD WIDTH(FEET) =   15.22
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.89
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.24
  STREET FLOW TRAVEL TIME(MIN.) =   3.93   Tc(MIN.) =  16.10
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.611
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7711
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    1.82      SUBAREA RUNOFF(CFS) =    3.66
  TOTAL AREA(ACRES) =      4.01        PEAK FLOW RATE(CFS) =       8.87

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.46   HALFSTREET FLOOD WIDTH(FEET) =  16.63
  FLOW VELOCITY(FEET/SEC.) =  3.07   DEPTH*VELOCITY(FT*FT/SEC.) =   1.41
  LONGEST FLOWPATH FROM NODE    324.00 TO NODE    306.00 =  1436.00 FEET.

 FLOW PROCESS FROM NODE    306.00 TO NODE    306.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =  16.10
  RAINFALL INTENSITY(INCH/HR) =   2.61
  TOTAL STREAM AREA(ACRES) =     4.01
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.87

  ** CONFLUENCE DATA **
  STREAM      RUNOFF       Tc       INTENSITY       AREA
```

```
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
     1        68.12     19.06         2.387         30.44
     2        27.98     20.34         2.307         14.98
     3         8.87     16.10         2.611          4.01

 ********************************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  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM      RUNOFF       Tc       INTENSITY
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
      1        88.54     16.10        2.611
      2       102.45     19.06        2.387
      3       101.63     20.34        2.307

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    102.45   Tc(MIN.) =   19.06
  TOTAL AREA(ACRES) =     49.43
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    306.00 =  3134.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    306.00 TO NODE    308.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 2618.00  DOWNSTREAM ELEVATION(FEET) = 2597.00
  STREET LENGTH(FEET) =  1695.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     106.84
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.76
    HALFSTREET FLOOD WIDTH(FEET) =   34.73
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.17
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.93
  STREET FLOW TRAVEL TIME(MIN.) =   5.47   Tc(MIN.) =  24.53
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.088
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7497
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    5.60      SUBAREA RUNOFF(CFS) =    8.77
  TOTAL AREA(ACRES) =     55.03       PEAK FLOW RATE(CFS) =     111.22

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.77   HALFSTREET FLOOD WIDTH(FEET) =  35.09
  FLOW VELOCITY(FEET/SEC.) =  5.25   DEPTH*VELOCITY(FT*FT/SEC.) =   4.03
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    308.00 =  4829.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    308.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
```

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 TIME OF CONCENTRATION(MIN.) =  24.53
 RAINFALL INTENSITY(INCH/HR) =   2.09
 TOTAL STREAM AREA(ACRES) =    55.03
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    111.22

****************************************************************************
 FLOW PROCESS FROM NODE    316.00 TO NODE    318.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
        ASSUMED INITIAL SUBAREA UNIFORM
        DEVELOPMENT IS SINGLE FAMILY (1/4 ACRE)
 TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   429.00
 UPSTREAM ELEVATION(FEET) =   2639.00
 DOWNSTREAM ELEVATION(FEET) =   2627.90
 ELEVATION DIFFERENCE(FEET) =     11.10
 TC = 0.393*[(  429.00**3)/(    11.10)]**.2 =    9.212
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.510
 SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7966
 SOIL CLASSIFICATION IS "B"
 SUBAREA RUNOFF(CFS) =     11.07
 TOTAL AREA(ACRES) =      3.96   TOTAL RUNOFF(CFS) =     11.07

****************************************************************************
 FLOW PROCESS FROM NODE    318.00 TO NODE    320.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 2627.90  DOWNSTREAM ELEVATION(FEET) = 2614.00
 STREET LENGTH(FEET) =  1283.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0130

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      23.61
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.50
   HALFSTREET FLOOD WIDTH(FEET) =   18.08
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.25
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.63
 STREET FLOW TRAVEL TIME(MIN.) =   6.58   Tc(MIN.) =  15.79
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.637
 SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7721
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =   12.11      SUBAREA RUNOFF(CFS) =   24.66
 TOTAL AREA(ACRES) =     16.07        PEAK FLOW RATE(CFS) =      35.73

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.56   HALFSTREET FLOOD WIDTH(FEET) =  20.88
 FLOW VELOCITY(FEET/SEC.) =  3.78   DEPTH*VELOCITY(FT*FT/SEC.) =   2.11
 LONGEST FLOWPATH FROM NODE    316.00 TO NODE    320.00 =  1712.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    320.00 TO NODE    322.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 2614.00  DOWNSTREAM ELEVATION(FEET) = 2602.50
 STREET LENGTH(FEET) =  1019.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00
```

C-13

C-14

C-15

```
 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0130

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      41.22
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.58
   HALFSTREET FLOOD WIDTH(FEET) =   21.80
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.03
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.32
 STREET FLOW TRAVEL TIME(MIN.) =   4.22   Tc(MIN.) =  20.01
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.327
 SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7603
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =    6.20      SUBAREA RUNOFF(CFS) =   10.97
 TOTAL AREA(ACRES) =     22.27        PEAK FLOW RATE(CFS) =      46.70

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.60   HALFSTREET FLOOD WIDTH(FEET) =  22.84
 FLOW VELOCITY(FEET/SEC.) =  4.18   DEPTH*VELOCITY(FT*FT/SEC.) =   2.50
 LONGEST FLOWPATH FROM NODE    316.00 TO NODE    322.00 =  2731.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    322.00 TO NODE    308.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  2602.50  DOWNSTREAM(FEET) =  2597.00
 FLOW LENGTH(FEET) =   370.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  24.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.02
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     46.70
 PIPE TRAVEL TIME(MIN.) =   0.56    Tc(MIN.) =  20.57
 LONGEST FLOWPATH FROM NODE    316.00 TO NODE    308.00 =  3101.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    308.00 TO NODE    308.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  20.57
 RAINFALL INTENSITY(INCH/HR) =   2.29
 TOTAL STREAM AREA(ACRES) =    22.27
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     46.70

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
     1       111.22     24.53         2.088          55.03
     2        46.70     20.57         2.293          22.27

 ***********************************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      139.95    20.57       2.293
    2      153.75    24.53       2.088

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =    153.75   Tc(MIN.) =   24.53
TOTAL AREA(ACRES) =     77.30
LONGEST FLOWPATH FROM NODE    300.00 TO NODE    308.00 =  4829.00 FEET.
```

```
 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        94.64     20.57        2.293
     2       109.35     30.71        1.854

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    109.35   Tc(MIN.) =   30.71
 TOTAL AREA(ACRES) =      64.84
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    308.00 =  4829.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    400.00 TO NODE    402.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS SINGLE FAMILY (1/4 ACRE)
 TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   396.00
 UPSTREAM ELEVATION(FEET) =   2695.00
 DOWNSTREAM ELEVATION(FEET) =   2688.60
 ELEVATION DIFFERENCE(FEET) =      6.40
 TC = 0.393*[(  396.00**3)/(     6.40)]**.2 =    9.802
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.396
 SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7939
 SOIL CLASSIFICATION IS "B"
 SUBAREA RUNOFF(CFS) =      2.80
 TOTAL AREA(ACRES) =      1.04   TOTAL RUNOFF(CFS) =      2.80

 FLOW PROCESS FROM NODE    402.00 TO NODE    406.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 2688.60  DOWNSTREAM ELEVATION(FEET) = 2650.00
 STREET LENGTH(FEET) =   888.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 32.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.15
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.29
   HALFSTREET FLOOD WIDTH(FEET) =    8.10
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.97
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.14
 STREET FLOW TRAVEL TIME(MIN.) =   3.73   Tc(MIN.) =  13.53
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.863
 SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7794
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =    2.99      SUBAREA RUNOFF(CFS) =    6.67
 TOTAL AREA(ACRES) =      4.03        PEAK FLOW RATE(CFS) =       9.48

 END OF SUBAREA STREET FLOW HYDRAULICS:
```

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```
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =   9.85
  FLOW VELOCITY(FEET/SEC.) =  4.35   DEPTH*VELOCITY(FT*FT/SEC.) =   1.41
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    406.00 =  1284.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    406.00 TO NODE    408.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 2650.00  DOWNSTREAM ELEVATION(FEET) = 2624.00
  STREET LENGTH(FEET) =  1063.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 32.00

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

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      37.18
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.51
    HALFSTREET FLOOD WIDTH(FEET) =   19.88
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.84
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.48
  STREET FLOW TRAVEL TIME(MIN.) =   3.66   Tc(MIN.) =  17.19
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.522
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7679
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =   28.49      SUBAREA RUNOFF(CFS) =   55.17
  TOTAL AREA(ACRES) =     32.52        PEAK FLOW RATE(CFS) =      64.64

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.60   HALFSTREET FLOOD WIDTH(FEET) =  28.75
  FLOW VELOCITY(FEET/SEC.) =  5.39   DEPTH*VELOCITY(FT*FT/SEC.) =   3.24
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L = 1063.0 FT WITH ELEVATION-DROP =  26.0 FT, IS   64.0 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    408.00
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    408.00 =  2347.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    408.00 TO NODE    408.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  17.19
  RAINFALL INTENSITY(INCH/HR) =   2.52
  TOTAL STREAM AREA(ACRES) =    32.52
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     64.64

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    412.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS SINGLE FAMILY (1/4 ACRE)
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   366.00
  UPSTREAM ELEVATION(FEET) =   2641.00
  DOWNSTREAM ELEVATION(FEET) =   2637.80
  ELEVATION DIFFERENCE(FEET) =      3.20
  TC = 0.393*[(  366.00**3)/(     3.20)]**.2 =   10.740
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.235
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7899
```

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```
 SOIL CLASSIFICATION IS "B"
 SUBAREA RUNOFF(CFS) =     16.31
 TOTAL AREA(ACRES) =      6.38   TOTAL RUNOFF(CFS) =     16.31
****************************************************************************
 FLOW PROCESS FROM NODE    412.00 TO NODE    408.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 2637.80  DOWNSTREAM ELEVATION(FEET) = 2624.00
 STREET LENGTH(FEET) =  1307.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0130

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      34.99
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.56
   HALFSTREET FLOOD WIDTH(FEET) =   20.82
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.72
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.07
 STREET FLOW TRAVEL TIME(MIN.) =   5.85   Tc(MIN.) =  16.59
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.569
 SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7697
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =   18.71      SUBAREA RUNOFF(CFS) =   37.00
 TOTAL AREA(ACRES) =     25.09        PEAK FLOW RATE(CFS) =      53.30

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.62   HALFSTREET FLOOD WIDTH(FEET) =  24.24
 FLOW VELOCITY(FEET/SEC.) =  4.27   DEPTH*VELOCITY(FT*FT/SEC.) =   2.67
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L = 1307.0 FT WITH ELEVATION-DROP =  13.8 FT, IS   36.2 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    408.00
 LONGEST FLOWPATH FROM NODE    410.00 TO NODE    408.00 =  1673.00 FEET.
****************************************************************************
 FLOW PROCESS FROM NODE    408.00 TO NODE    408.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  16.59
 RAINFALL INTENSITY(INCH/HR) =   2.57
 TOTAL STREAM AREA(ACRES) =    25.09
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     53.30

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
     1        64.64     17.19         2.522          32.52
     2        53.30     16.59         2.569          25.09

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

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```
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM      RUNOFF      Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)   (INCH/HOUR)
     1       115.71    16.59        2.569
     2       116.96    17.19        2.522

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    116.96   Tc(MIN.) =   17.19
 TOTAL AREA(ACRES) =     57.61
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    408.00 =  2347.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    408.00 TO NODE    414.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 2624.00  DOWNSTREAM ELEVATION(FEET) = 2612.00
 STREET LENGTH(FEET) =   809.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     124.01
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.77
   HALFSTREET FLOOD WIDTH(FEET) =   35.34
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.76
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    4.45
 STREET FLOW TRAVEL TIME(MIN.) =   2.34   Tc(MIN.) =  19.53
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.357
 SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7615
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =    7.85      SUBAREA RUNOFF(CFS) =   14.09
 TOTAL AREA(ACRES) =     65.46       PEAK FLOW RATE(CFS) =     131.05

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.78   HALFSTREET FLOOD WIDTH(FEET) =  35.89
 FLOW VELOCITY(FEET/SEC.) =  5.87   DEPTH*VELOCITY(FT*FT/SEC.) =   4.61
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    414.00 =  3156.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    414.00 TO NODE    414.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  19.53
 RAINFALL INTENSITY(INCH/HR) =   2.36
 TOTAL STREAM AREA(ACRES) =    65.46
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    131.05

****************************************************************************
 FLOW PROCESS FROM NODE    818.00 TO NODE    820.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS: UNDEVELOPED WITH GOOD COVER
 TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
```

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H-1

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   531.00
  UPSTREAM ELEVATION(FEET) =   2628.50
  DOWNSTREAM ELEVATION(FEET) =   2621.50
  ELEVATION DIFFERENCE(FEET) =      7.00
  TC = 0.937*[(  531.00**3)/(     7.00)]**.2 =   27.413
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.969
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .5874
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      3.00
  TOTAL AREA(ACRES) =      2.59   TOTAL RUNOFF(CFS) =      3.00

****************************************************************************
  FLOW PROCESS FROM NODE    820.00 TO NODE    822.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   2621.50  DOWNSTREAM(FEET) =   2613.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   716.00   CHANNEL SLOPE =  0.0119
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0119 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      3.00
  FLOW VELOCITY(FEET/SEC) =   0.88 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  13.57   Tc(MIN.) =  40.99
  LONGEST FLOWPATH FROM NODE    818.00 TO NODE    822.00 =  1247.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    822.00 TO NODE    822.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.591
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .5427
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =   10.33   SUBAREA RUNOFF(CFS) =    8.92
  TOTAL AREA(ACRES) =     12.92   TOTAL RUNOFF(CFS) =   11.91
  TC(MIN.) =  40.99

****************************************************************************
  FLOW PROCESS FROM NODE    822.00 TO NODE    414.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2613.00  DOWNSTREAM(FEET) =  2612.00
  FLOW LENGTH(FEET) =   200.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.35
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     11.91
  PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =  41.61
  LONGEST FLOWPATH FROM NODE    818.00 TO NODE    414.00 =  1447.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    414.00 TO NODE    414.00 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.) =  41.61
  RAINFALL INTENSITY(INCH/HR) =   1.58
  TOTAL STREAM AREA(ACRES) =    12.92
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.91

  ** CONFLUENCE DATA **
  STREAM      RUNOFF       Tc       INTENSITY       AREA
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
      1       131.05     19.53         2.357         65.46
      2        11.91     41.61         1.578         12.92
```

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```
**********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      136.64    19.53       2.357
     2       99.68    41.61       1.578

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =    136.64   Tc(MIN.) =   19.53
 TOTAL AREA(ACRES) =     78.38
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    414.00 =  3156.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    414.00 TO NODE    416.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 2612.00  DOWNSTREAM ELEVATION(FEET) = 2601.00
 STREET LENGTH(FEET) =  2152.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 32.00

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

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     153.70
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.95
   HALFSTREET FLOOD WIDTH(FEET) =   54.32
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.64
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.45
 STREET FLOW TRAVEL TIME(MIN.) =   9.85   Tc(MIN.) =  29.38
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.898
 SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7400
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =   24.26      SUBAREA RUNOFF(CFS) =   34.07
 TOTAL AREA(ACRES) =    102.64        PEAK FLOW RATE(CFS) =     170.71

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.98   HALFSTREET FLOOD WIDTH(FEET) =  55.84
 FLOW VELOCITY(FEET/SEC.) =  3.75   DEPTH*VELOCITY(FT*FT/SEC.) =   3.66
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L = 2152.0 FT WITH ELEVATION-DROP =  11.0 FT, IS   38.2 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    416.00
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    416.00 =  5308.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    416.00 TO NODE    250.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  2601.00  DOWNSTREAM(FEET) =  2592.00
 FLOW LENGTH(FEET) =   500.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  36.8 INCHES
```

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```
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.53
 ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =    170.71
 PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =  29.88
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    250.00 =  5808.00 FEET.
****************************************************************************
 FLOW PROCESS FROM NODE    500.00 TO NODE    502.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
        ASSUMED INITIAL SUBAREA UNIFORM
        DEVELOPMENT IS SINGLE FAMILY (1/4 ACRE)
 TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   498.00
 UPSTREAM ELEVATION(FEET) =   2620.00
 DOWNSTREAM ELEVATION(FEET) =   2611.50
 ELEVATION DIFFERENCE(FEET) =      8.50
 TC = 0.393*[(  498.00**3)/(     8.50)]**.2 =   10.627
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.254
 SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7904
 SOIL CLASSIFICATION IS "B"
 SUBAREA RUNOFF(CFS) =      6.92
 TOTAL AREA(ACRES) =      2.69   TOTAL RUNOFF(CFS) =      6.92
****************************************************************************
 FLOW PROCESS FROM NODE    502.00 TO NODE    504.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 2611.50  DOWNSTREAM ELEVATION(FEET) = 2601.70
 STREET LENGTH(FEET) =  1092.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0130

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      22.41
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.51
   HALFSTREET FLOOD WIDTH(FEET) =   18.32
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.01
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.52
 STREET FLOW TRAVEL TIME(MIN.) =   6.04   Tc(MIN.) =  16.67
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.563
 SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7694
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =   15.49      SUBAREA RUNOFF(CFS) =   30.55
 TOTAL AREA(ACRES) =     18.18        PEAK FLOW RATE(CFS) =      37.46

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.58   HALFSTREET FLOOD WIDTH(FEET) =  21.98
 FLOW VELOCITY(FEET/SEC.) =  3.60   DEPTH*VELOCITY(FT*FT/SEC.) =   2.09
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L = 1092.0 FT WITH ELEVATION-DROP =   9.8 FT, IS   30.7 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    504.00
 LONGEST FLOWPATH FROM NODE    500.00 TO NODE    504.00 =  1590.00 FEET.
****************************************************************************
 FLOW PROCESS FROM NODE    504.00 TO NODE    506.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
```

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```
==========================================================================
  UPSTREAM ELEVATION(FEET) = 2601.70  DOWNSTREAM ELEVATION(FEET) = 2588.90
  STREET LENGTH(FEET) =  1336.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0130

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      51.04
    ***STREET FLOWING FULL***
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.63
    HALFSTREET FLOOD WIDTH(FEET) =   24.30
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.07
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.55
  STREET FLOW TRAVEL TIME(MIN.) =   5.47   Tc(MIN.) =  22.14
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.205
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7551
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =   16.27      SUBAREA RUNOFF(CFS) =   27.09
  TOTAL AREA(ACRES) =     34.45        PEAK FLOW RATE(CFS) =      64.55

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.67   HALFSTREET FLOOD WIDTH(FEET) =  26.50
  FLOW VELOCITY(FEET/SEC.) =  4.37   DEPTH*VELOCITY(FT*FT/SEC.) =   2.93
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L = 1336.0 FT WITH ELEVATION-DROP =  12.8 FT, IS   31.0 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    506.00
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    506.00 =  2926.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    506.00 TO NODE    514.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2588.90  DOWNSTREAM(FEET) =  2580.50
  FLOW LENGTH(FEET) =   888.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.30
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     64.55
  PIPE TRAVEL TIME(MIN.) =   1.44    Tc(MIN.) =  23.58
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    514.00 =  3814.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    514.00 TO NODE    514.00 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.) =  23.58
  RAINFALL INTENSITY(INCH/HR) =   2.13
  TOTAL STREAM AREA(ACRES) =    34.45
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     64.55

****************************************************************************
  FLOW PROCESS FROM NODE    508.00 TO NODE    510.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS SINGLE FAMILY (1/4 ACRE)
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
```

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```
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   888.00
 UPSTREAM ELEVATION(FEET) =   2619.00
 DOWNSTREAM ELEVATION(FEET) =   2608.00
 ELEVATION DIFFERENCE(FEET) =     11.00
 TC = 0.393*[(  888.00**3)/(    11.00)]**.2 =   14.280
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.782
 SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7769
 SOIL CLASSIFICATION IS "B"
 SUBAREA RUNOFF(CFS) =      1.71
 TOTAL AREA(ACRES) =      0.79   TOTAL RUNOFF(CFS) =      1.71
```

```
 FLOW PROCESS FROM NODE    510.00 TO NODE    512.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 2608.00  DOWNSTREAM ELEVATION(FEET) = 2585.80
 STREET LENGTH(FEET) =  1072.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 19.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.50
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.70
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.38
   HALFSTREET FLOOD WIDTH(FEET) =   13.92
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.41
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.29
 STREET FLOW TRAVEL TIME(MIN.) =   5.24   Tc(MIN.) =  19.52
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.357
 CONDOMINIUM DEVELOPMENT RUNOFF COEFFICIENT = .8031
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =   11.56      SUBAREA RUNOFF(CFS) =   21.88
 TOTAL AREA(ACRES) =     12.35        PEAK FLOW RATE(CFS) =      23.59

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  17.78
 FLOW VELOCITY(FEET/SEC.) =  3.98   DEPTH*VELOCITY(FT*FT/SEC.) =   1.79
 LONGEST FLOWPATH FROM NODE    508.00 TO NODE    512.00 =  1960.00 FEET.
```

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```
 FLOW PROCESS FROM NODE    512.00 TO NODE    514.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 2585.80  DOWNSTREAM ELEVATION(FEET) = 2580.50
 STREET LENGTH(FEET) =   730.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 19.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.50
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      30.06
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.55
```

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```
    HALFSTREET FLOOD WIDTH(FEET) =   21.38
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.08
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.69
  STREET FLOW TRAVEL TIME(MIN.) =   3.95   Tc(MIN.) =  23.47
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.138
  CONDOMINIUM DEVELOPMENT RUNOFF COEFFICIENT = .7964
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    7.59      SUBAREA RUNOFF(CFS) =   12.92
  TOTAL AREA(ACRES) =     19.94        PEAK FLOW RATE(CFS) =      36.52

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.58   HALFSTREET FLOOD WIDTH(FEET) =  22.90
  FLOW VELOCITY(FEET/SEC.) =  3.29   DEPTH*VELOCITY(FT*FT/SEC.) =   1.90
  LONGEST FLOWPATH FROM NODE    508.00 TO NODE    514.00 =  2690.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    514.00 TO NODE    514.00 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.) =  23.47
  RAINFALL INTENSITY(INCH/HR) =   2.14
  TOTAL STREAM AREA(ACRES) =    19.94
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     36.52

  ** CONFLUENCE DATA **
  STREAM      RUNOFF       Tc       INTENSITY       AREA
  NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
      1        64.55     23.58         2.133          34.45
      2        36.52     23.47         2.138          19.94

 ********************************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       100.76     23.47        2.138
      2       100.97     23.58        2.133

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    100.97   Tc(MIN.) =   23.58
  TOTAL AREA(ACRES) =     54.39
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    514.00 =  3814.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    514.00 TO NODE    520.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2580.50  DOWNSTREAM(FEET) =  2578.00
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  26.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.66
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    100.97
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =  23.63
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    520.00 =  3874.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    520.00 TO NODE    520.00 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.) =  23.63
  RAINFALL INTENSITY(INCH/HR) =   2.13
  TOTAL STREAM AREA(ACRES) =    54.39
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    100.97

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
  FLOW PROCESS FROM NODE    516.00 TO NODE    518.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS CONDOMINIUM
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   963.00
  UPSTREAM ELEVATION(FEET) =   2597.00
  DOWNSTREAM ELEVATION(FEET) =   2581.00
  ELEVATION DIFFERENCE(FEET) =     16.00
  TC = 0.359*[(  963.00**3)/(    16.00)]**.2 =   12.726
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.957
  CONDOMINIUM DEVELOPMENT RUNOFF COEFFICIENT = .8176
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      5.10
  TOTAL AREA(ACRES) =      2.11   TOTAL RUNOFF(CFS) =      5.10

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
  FLOW PROCESS FROM NODE    518.00 TO NODE    520.00 IS CODE =  61
------------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) = 2581.00  DOWNSTREAM ELEVATION(FEET) = 2578.00
  STREET LENGTH(FEET) =   304.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 32.00

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

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.18
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
    HALFSTREET FLOOD WIDTH(FEET) =   11.27
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.23
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.78
  STREET FLOW TRAVEL TIME(MIN.) =   2.28   Tc(MIN.) =  15.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.710
  CONDOMINIUM DEVELOPMENT RUNOFF COEFFICIENT = .8122
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =    0.98      SUBAREA RUNOFF(CFS) =    2.16
  TOTAL AREA(ACRES) =      3.09        PEAK FLOW RATE(CFS) =       7.26

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  12.01
  FLOW VELOCITY(FEET/SEC.) =  2.33   DEPTH*VELOCITY(FT*FT/SEC.) =   0.85
  LONGEST FLOWPATH FROM NODE    516.00 TO NODE    520.00 =  1267.00 FEET.

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
  FLOW PROCESS FROM NODE    520.00 TO NODE    520.00 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.) =  15.00
  RAINFALL INTENSITY(INCH/HR) =   2.71
  TOTAL STREAM AREA(ACRES) =     3.09
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.26

  ** CONFLUENCE DATA **
  STREAM      RUNOFF      Tc       INTENSITY      AREA
  NUMBER       (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1       100.97    23.63        2.130         54.39
      2         7.26    15.00        2.710          3.09

 **********************************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        71.36    15.00        2.710
      2       106.68    23.63        2.130

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    106.68   Tc(MIN.) =   23.63
  TOTAL AREA(ACRES) =     57.48
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    520.00 =  3874.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    520.00 TO NODE    522.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2578.00  DOWNSTREAM(FEET) =  2574.00
  FLOW LENGTH(FEET) =   130.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  28.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.88
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    106.68
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =  23.75
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    522.00 =  4004.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    600.00 TO NODE    602.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS SINGLE FAMILY (1/4 ACRE)
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   840.00
  UPSTREAM ELEVATION(FEET) =   2601.00
  DOWNSTREAM ELEVATION(FEET) =   2587.50
  ELEVATION DIFFERENCE(FEET) =     13.50
  TC = 0.393*[(  840.00**3)/(    13.50)]**.2 =   13.257
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.894
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7804
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =     12.19
  TOTAL AREA(ACRES) =      5.40   TOTAL RUNOFF(CFS) =     12.19

****************************************************************************
  FLOW PROCESS FROM NODE    602.00 TO NODE    604.00 IS CODE =  62
----------------------------------------------------------------------------
```

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F-2

```
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) = 2587.50  DOWNSTREAM ELEVATION(FEET) = 2569.00
  STREET LENGTH(FEET) =  1003.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0130

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      24.41
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.47
    HALFSTREET FLOOD WIDTH(FEET) =   17.26
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.94
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.86
  STREET FLOW TRAVEL TIME(MIN.) =   4.24   Tc(MIN.) =  17.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.498
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7670
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =   12.71      SUBAREA RUNOFF(CFS) =   24.35
  TOTAL AREA(ACRES) =     18.11        PEAK FLOW RATE(CFS) =      36.55

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.52   HALFSTREET FLOOD WIDTH(FEET) =  19.11
  FLOW VELOCITY(FEET/SEC.) =  4.55   DEPTH*VELOCITY(FT*FT/SEC.) =   2.37
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    604.00 =  1843.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    604.00 TO NODE    604.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =  17.50
  RAINFALL INTENSITY(INCH/HR) =   2.50
  TOTAL STREAM AREA(ACRES) =    18.11
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     36.55

****************************************************************************
  FLOW PROCESS FROM NODE    606.00 TO NODE    608.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS SINGLE FAMILY (1/4 ACRE)
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   837.00
  UPSTREAM ELEVATION(FEET) =   2589.00
  DOWNSTREAM ELEVATION(FEET) =   2577.80
  ELEVATION DIFFERENCE(FEET) =     11.20
  TC = 0.393*[(  837.00**3)/(    11.20)]**.2 =   13.732
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.840
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7787
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      8.14
  TOTAL AREA(ACRES) =      3.68   TOTAL RUNOFF(CFS) =      8.14

****************************************************************************
  FLOW PROCESS FROM NODE    608.00 TO NODE    604.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
================================================================================
```

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F-4

```
 UPSTREAM ELEVATION(FEET) = 2577.80  DOWNSTREAM ELEVATION(FEET) = 2569.00
 STREET LENGTH(FEET) =  1077.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0130

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      16.48
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.47
   HALFSTREET FLOOD WIDTH(FEET) =   17.40
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.62
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.24
 STREET FLOW TRAVEL TIME(MIN.) =   6.86   Tc(MIN.) =  20.59
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.292
 SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7588
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =     9.52      SUBAREA RUNOFF(CFS) =   16.55
 TOTAL AREA(ACRES) =     13.20        PEAK FLOW RATE(CFS) =      24.69

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.52   HALFSTREET FLOOD WIDTH(FEET) =  19.24
 FLOW VELOCITY(FEET/SEC.) =  3.04   DEPTH*VELOCITY(FT*FT/SEC.) =   1.59
 LONGEST FLOWPATH FROM NODE    606.00 TO NODE    604.00 =  1914.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    604.00 TO NODE    604.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =  20.59
 RAINFALL INTENSITY(INCH/HR) =   2.29
 TOTAL STREAM AREA(ACRES) =    13.20
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     24.69

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
     1        36.55     17.50         2.498         18.11
     2        24.69     20.59         2.292         13.20

**********************************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        57.54     17.50         2.498
     2        58.22     20.59         2.292

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     57.54   Tc(MIN.) =   17.50
 TOTAL AREA(ACRES) =     31.31
 LONGEST FLOWPATH FROM NODE    606.00 TO NODE    604.00 =  1914.00 FEET.

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

```
 FLOW PROCESS FROM NODE     700.00 TO NODE     702.00 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) =   435.00
 UPSTREAM ELEVATION(FEET) =   2596.00
 DOWNSTREAM ELEVATION(FEET) =   2593.50
 ELEVATION DIFFERENCE(FEET) =      2.50
 TC = 0.303*[(  435.00**3)/(     2.50)]**.2 =    9.663
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.422
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8789
 SOIL CLASSIFICATION IS "B"
 SUBAREA RUNOFF(CFS) =     12.36
 TOTAL AREA(ACRES) =      4.11   TOTAL RUNOFF(CFS) =     12.36

****************************************************************************
 FLOW PROCESS FROM NODE     702.00 TO NODE     704.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   2593.50  DOWNSTREAM(FEET) =   2585.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   554.00   CHANNEL SLOPE =  0.0153
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0153 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =     12.36
 FLOW VELOCITY(FEET/SEC) =   1.60 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   5.76   Tc(MIN.) =  15.42
 LONGEST FLOWPATH FROM NODE    700.00 TO NODE    704.00 =   989.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     704.00 TO NODE     704.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.671
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8746
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =     5.92   SUBAREA RUNOFF(CFS) =   13.83
 TOTAL AREA(ACRES) =     10.03   TOTAL RUNOFF(CFS) =   26.19
 TC(MIN.) =  15.42

****************************************************************************
 FLOW PROCESS FROM NODE     704.00 TO NODE     704.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =  15.42
 RAINFALL INTENSITY(INCH/HR) =   2.67
 TOTAL STREAM AREA(ACRES) =    10.03
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     26.19

****************************************************************************
 FLOW PROCESS FROM NODE     706.00 TO NODE     708.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
        ASSUMED INITIAL SUBAREA UNIFORM
        DEVELOPMENT IS SINGLE FAMILY (1/4 ACRE)
 TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   722.00
 UPSTREAM ELEVATION(FEET) =   2606.20
 DOWNSTREAM ELEVATION(FEET) =   2598.50
 ELEVATION DIFFERENCE(FEET) =      7.70
 TC = 0.393*[(  722.00**3)/(     7.70)]**.2 =   13.545
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.861
```

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G-3

```
 SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7794
 SOIL CLASSIFICATION IS "B"
 SUBAREA RUNOFF(CFS) =      9.16
 TOTAL AREA(ACRES) =      4.11   TOTAL RUNOFF(CFS) =      9.16
```

```
 FLOW PROCESS FROM NODE    708.00 TO NODE    704.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 2598.50  DOWNSTREAM ELEVATION(FEET) = 2585.00
 STREET LENGTH(FEET) =   454.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0130

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      14.64
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.46
   HALFSTREET FLOOD WIDTH(FEET) =   16.91
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.92
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.28
 STREET FLOW TRAVEL TIME(MIN.) =   1.54   Tc(MIN.) =  15.08
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.702
 SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7743
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =    5.23      SUBAREA RUNOFF(CFS) =   10.94
 TOTAL AREA(ACRES) =      9.34        PEAK FLOW RATE(CFS) =      20.11

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.49   HALFSTREET FLOOD WIDTH(FEET) =  18.00
 FLOW VELOCITY(FEET/SEC.) =  5.13   DEPTH*VELOCITY(FT*FT/SEC.) =   2.49
 LONGEST FLOWPATH FROM NODE    706.00 TO NODE    704.00 =  1176.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    704.00 TO NODE    704.00 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.) =  15.08
 RAINFALL INTENSITY(INCH/HR) =   2.70
 TOTAL STREAM AREA(ACRES) =     9.34
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     20.11

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
     1        26.19     15.42         2.671          10.03
     2        20.11     15.08         2.702           9.34

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

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```
 STREAM      RUNOFF      Tc       INTENSITY
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)
     1        45.72     15.08        2.702
     2        46.06     15.42        2.671

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     46.06   Tc(MIN.) =   15.42
 TOTAL AREA(ACRES) =     19.37
 LONGEST FLOWPATH FROM NODE    706.00 TO NODE    704.00 =  1176.00 FEET.
****************************************************************************
 FLOW PROCESS FROM NODE    704.00 TO NODE    710.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 2585.00  DOWNSTREAM ELEVATION(FEET) = 2578.00
 STREET LENGTH(FEET) =  1302.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0130

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      53.85
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.69
   HALFSTREET FLOOD WIDTH(FEET) =   27.60
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.37
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.33
 STREET FLOW TRAVEL TIME(MIN.) =   6.43   Tc(MIN.) =  21.86
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.220
 SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7557
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =    9.26      SUBAREA RUNOFF(CFS) =   15.54
 TOTAL AREA(ACRES) =     28.63        PEAK FLOW RATE(CFS) =      61.60

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.72   HALFSTREET FLOOD WIDTH(FEET) =  29.06
 FLOW VELOCITY(FEET/SEC.) =  3.50   DEPTH*VELOCITY(FT*FT/SEC.) =   2.52
 LONGEST FLOWPATH FROM NODE    706.00 TO NODE    710.00 =  2478.00 FEET.
****************************************************************************
 FLOW PROCESS FROM NODE    710.00 TO NODE    712.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 2578.00  DOWNSTREAM ELEVATION(FEET) = 2552.00
 STREET LENGTH(FEET) =  1677.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 16.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   8.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      85.35
   ***STREET FLOWING FULL***
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.69
```

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    HALFSTREET FLOOD WIDTH(FEET) =   25.43
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.73
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.95
  STREET FLOW TRAVEL TIME(MIN.) =   4.88   Tc(MIN.) =  26.73
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.995
  CONDOMINIUM DEVELOPMENT RUNOFF COEFFICIENT = .7916
  SOIL CLASSIFICATION IS "B"
  SUBAREA AREA(ACRES) =   30.01      SUBAREA RUNOFF(CFS) =   47.40
  TOTAL AREA(ACRES) =     58.64        PEAK FLOW RATE(CFS) =     109.00

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.75   HALFSTREET FLOOD WIDTH(FEET) =  28.36
  FLOW VELOCITY(FEET/SEC.) =  6.04   DEPTH*VELOCITY(FT*FT/SEC.) =   4.51
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L = 1677.0 FT WITH ELEVATION-DROP =  26.0 FT, IS   63.4 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    712.00
  LONGEST FLOWPATH FROM NODE    706.00 TO NODE    712.00 =  4155.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    712.00 TO NODE    712.00 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.) =  26.73
  RAINFALL INTENSITY(INCH/HR) =   2.00
  TOTAL STREAM AREA(ACRES) =    58.64
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    109.00

****************************************************************************
  FLOW PROCESS FROM NODE    714.00 TO NODE    716.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS SINGLE FAMILY (1/4 ACRE)
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =  1000.00
  UPSTREAM ELEVATION(FEET) =   2715.00
  DOWNSTREAM ELEVATION(FEET) =   2675.00
  ELEVATION DIFFERENCE(FEET) =     40.00
  TC = 0.393*[( 1000.00**3)/(    40.00)]**.2 =   11.845
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.072
  SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7856
  SOIL CLASSIFICATION IS "B"
  SUBAREA RUNOFF(CFS) =      5.33
  TOTAL AREA(ACRES) =      2.21   TOTAL RUNOFF(CFS) =      5.33

****************************************************************************
  FLOW PROCESS FROM NODE    716.00 TO NODE    718.00 IS CODE =  61
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 2675.00  DOWNSTREAM ELEVATION(FEET) = 2635.00
  STREET LENGTH(FEET) =  1000.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 39.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  19.50
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.98
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.33
```

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```
   HALFSTREET FLOOD WIDTH(FEET) =    8.80
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.14
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.38
 STREET FLOW TRAVEL TIME(MIN.) =   4.03   Tc(MIN.) =  15.87
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.630
 SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7718
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =    2.60      SUBAREA RUNOFF(CFS) =    5.28
 TOTAL AREA(ACRES) =      4.81        PEAK FLOW RATE(CFS) =      10.61

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  10.10
 FLOW VELOCITY(FEET/SEC.) =  4.39   DEPTH*VELOCITY(FT*FT/SEC.) =   1.58
 LONGEST FLOWPATH FROM NODE    714.00 TO NODE    718.00 =  2000.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    718.00 TO NODE    720.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 2635.00  DOWNSTREAM ELEVATION(FEET) = 2605.00
 STREET LENGTH(FEET) =  1000.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 39.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  14.50
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      13.05
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.39
   HALFSTREET FLOOD WIDTH(FEET) =   11.80
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.13
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.63
 STREET FLOW TRAVEL TIME(MIN.) =   4.04   Tc(MIN.) =  19.91
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.332
 SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7605
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =    2.75      SUBAREA RUNOFF(CFS) =    4.88
 TOTAL AREA(ACRES) =      7.56        PEAK FLOW RATE(CFS) =      15.49

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  12.77
 FLOW VELOCITY(FEET/SEC.) =  4.26   DEPTH*VELOCITY(FT*FT/SEC.) =   1.76
 LONGEST FLOWPATH FROM NODE    714.00 TO NODE    720.00 =  3000.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    720.00 TO NODE    722.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 2605.00  DOWNSTREAM ELEVATION(FEET) = 2575.00
 STREET LENGTH(FEET) =  1000.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 39.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  19.50
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200
```

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   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      17.17
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.42
   HALFSTREET FLOOD WIDTH(FEET) =   13.31
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.37
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.86
 STREET FLOW TRAVEL TIME(MIN.) =   3.81   Tc(MIN.) =  23.72
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.126
 SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7514
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =    2.10      SUBAREA RUNOFF(CFS) =    3.35
 TOTAL AREA(ACRES) =      9.66        PEAK FLOW RATE(CFS) =      18.84

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.44   HALFSTREET FLOOD WIDTH(FEET) =  13.86
 FLOW VELOCITY(FEET/SEC.) =  4.46   DEPTH*VELOCITY(FT*FT/SEC.) =   1.94
 LONGEST FLOWPATH FROM NODE    714.00 TO NODE    722.00 =  4000.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    722.00 TO NODE    712.00 IS CODE =  61
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 2575.00  DOWNSTREAM ELEVATION(FEET) = 2552.00
 STREET LENGTH(FEET) =  1434.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 39.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  19.50
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0160
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      20.77
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.49
   HALFSTREET FLOOD WIDTH(FEET) =   16.39
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.61
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.76
 STREET FLOW TRAVEL TIME(MIN.) =   6.62   Tc(MIN.) =  30.34
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  1.866
 SINGLE-FAMILY(1/4 ACRE LOT) RUNOFF COEFFICIENT = .7382
 SOIL CLASSIFICATION IS "B"
 SUBAREA AREA(ACRES) =    2.80      SUBAREA RUNOFF(CFS) =    3.86
 TOTAL AREA(ACRES) =     12.46        PEAK FLOW RATE(CFS) =      22.70

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.50   HALFSTREET FLOOD WIDTH(FEET) =  17.00
 FLOW VELOCITY(FEET/SEC.) =  3.68   DEPTH*VELOCITY(FT*FT/SEC.) =   1.84
 LONGEST FLOWPATH FROM NODE    714.00 TO NODE    712.00 =  5434.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    712.00 TO NODE    712.00 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.) =  30.34
 RAINFALL INTENSITY(INCH/HR) =   1.87
 TOTAL STREAM AREA(ACRES) =    12.46
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     22.70

 ** CONFLUENCE DATA **
 STREAM      RUNOFF       Tc       INTENSITY       AREA
 NUMBER       (CFS)     (MIN.)    (INCH/HOUR)     (ACRE)
```

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     1      109.00    26.73        1.995         58.64
     2       22.70    30.34        1.866         12.46

 ********************************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      129.00    26.73       1.995
     2      124.62    30.34       1.866

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    129.00   Tc(MIN.) =   26.73
  TOTAL AREA(ACRES) =     71.10
  LONGEST FLOWPATH FROM NODE    714.00 TO NODE    712.00 =  5434.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =     71.10  TC(MIN.) =     26.73
  PEAK FLOW RATE(CFS)    =    129.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

TECHNICAL APPENDIX

APPENDIX B

Pipe Capacities Calculations by FlowMaster

Pipe 1
Worksheet for Circular Channel

Project Description	
Worksheet	Pipe 01
Flow Element	Circular Chann
Method	Manning's For
Solve For	Discharge

Input Data		
Mannings Coeffic	0.013	
Slope	012300	ft/ft
Depth	3.00	ft
Diameter	36	in

Results		
Discharge	73.97	cfs
Flow Area	7.1	ft²
Wetted Perime	9.42	ft
Top Width	7.3e-8	ft
Critical Depth	2.71	ft
Percent Full	100.0	%
Critical Slope	0.010804	ft/ft
Velocity	10.46	ft/s
Velocity Head	1.70	ft
Specific Energ	4.70	ft
Froude Numbe	1.87e-4	
Maximum Disc	79.57	cfs
Discharge Full	73.97	cfs
Slope Full	0.012300	ft/ft
Flow Type	Subcritical	

Pipe 2
Worksheet for Circular Channel

Project Description	
Worksheet	Pipe 02
Flow Element	Circular Chann
Method	Manning's For
Solve For	Discharge

Input Data		
Mannings Coeffic	0.013	
Slope	017200	ft/ft
Depth	3.00	ft
Diameter	36	in

Results		
Discharge	87.47	cfs
Flow Area	7.1	ft²
Wetted Perime	9.42	ft
Top Width	7.3e-8	ft
Critical Depth	2.83	ft
Percent Full	100.0	%
Critical Slope	0.014870	ft/ft
Velocity	12.37	ft/s
Velocity Head	2.38	ft
Specific Energ	5.38	ft
Froude Numbe	2.22e-4	
Maximum Disc	94.09	cfs
Discharge Full	87.47	cfs
Slope Full	0.017200	ft/ft
Flow Type	Subcritical	

Pipe 3
Worksheet for Circular Channel

Project Description	
Worksheet	Pipe 03
Flow Element	Circular Chann
Method	Manning's For
Solve For	Discharge

Input Data		
Mannings Coeffic	0.013	
Slope	012400	ft/ft
Depth	4.00	ft
Diameter	48	in

Results		
Discharge	159.95	cfs
Flow Area	12.6	ft²
Wetted Perime	12.57	ft
Top Width	1.19e-7	ft
Critical Depth	3.67	ft
Percent Full	100.0	%
Critical Slope	0.010783	ft/ft
Velocity	12.73	ft/s
Velocity Head	2.52	ft
Specific Energ	6.52	ft
Froude Numbe	2.19e-4	
Maximum Disc	172.05	cfs
Discharge Full	159.95	cfs
Slope Full	0.012400	ft/ft
Flow Type	Subcritical	

Pipe 4
Worksheet for Circular Channel

Project Description	
Worksheet	Pipe 04
Flow Element	Circular Chann
Method	Manning's Forr
Solve For	Discharge

Input Data		
Mannings Coeffic	0.013	
Slope	025000	ft/ft
Depth	2.50	ft
Diameter	30	in

Results		
Discharge	65.13	cfs
Flow Area	4.9	ft²
Wetted Perime	7.87	ft
Top Width	6.67e-8	ft
Critical Depth	2.42	ft
Percent Full	100.0	%
Critical Slope	0.021957	ft/ft
Velocity	13.23	ft/s
Velocity Head	2.72	ft
Specific Energy	5.22	ft
Froude Numbe	2.71e-4	
Maximum Disc	70.06	cfs
Discharge Full	65.13	cfs
Slope Full	0.025000	ft/ft
Flow Type	Subcritical	

Pipe 5
Worksheet for Circular Channel

Project Description	
Worksheet	Pipe 05
Flow Element	Circular Chann
Method	Manning's For
Solve For	Discharge

Input Data		
Mannings Coeffic	0.013	
Slope	014800	ft/ft
Depth	3.75	ft
Diameter	45	in

Results		
Discharge	147.11	cfs
Flow Area	11.0	ft²
Wetted Perime	11.78	ft
Top Width	8.16e-8	ft
Critical Depth	3.51	ft
Percent Full	100.0	%
Critical Slope	0.012792	ft/ft
Velocity	13.32	ft/s
Velocity Head	2.76	ft
Specific Energy	6.51	ft
Froude Numbe	2.02e-4	
Maximum Disc	158.25	cfs
Discharge Full	147.11	cfs
Slope Full	0.014800	ft/ft
Flow Type	Subcritical	

Pipe 6
Worksheet for Circular Channel

Project Description	
Worksheet	Pipe 06
Flow Element	Circular Chann
Method	Manning's Forr
Solve For	Discharge

Input Data		
Mannings Coeffic	0.013	
Slope	005150	ft/ft
Depth	2.00	ft
Diameter	24	in

Results		
Discharge	16.23	cfs
Flow Area	3.1	ft²
Wetted Perime	6.28	ft
Top Width	5.96e-8	ft
Critical Depth	1.45	ft
Percent Full	100.0	%
Critical Slope	0.006689	ft/ft
Velocity	5.17	ft/s
Velocity Head	0.41	ft
Specific Energ	2.41	ft
Froude Numbe	1.25e-4	
Maximum Disc	17.46	cfs
Discharge Full	16.23	cfs
Slope Full	0.005150	ft/ft
Flow Type	Subcritical	

Pipe 7
Worksheet for Circular Channel

Project Description	
Worksheet	Pipe 07
Flow Element	Circular Chann
Method	Manning's For
Solve For	Discharge

Input Data		
Mannings Coeffic	0.013	
Slope	005110	ft/ft
Depth	5.00	ft
Diameter	60	in

Results		
Discharge	186.17	cfs
Flow Area	19.6	ft²
Wetted Perime	15.71	ft
Top Width	1.33e-7	ft
Critical Depth	3.91	ft
Percent Full	100.0	%
Critical Slope	0.005616	ft/ft
Velocity	9.48	ft/s
Velocity Head	1.40	ft
Specific Energy	6.40	ft
Froude Numbe	1.38e-4	
Maximum Disc	200.26	cfs
Discharge Full	186.17	cfs
Slope Full	0.005110	ft/ft
Flow Type	Subcritical	

Pipe 8
Worksheet for Circular Channel

Project Description	
Worksheet	Pipe 08
Flow Element	Circular Chann
Method	Manning's For
Solve For	Discharge

Input Data		
Mannings Coeffic	0.013	
Slope	092400	ft/ft
Depth	3.00	ft
Diameter	36	in

Results		
Discharge	202.73	cfs
Flow Area	7.1	ft²
Wetted Perime	9.42	ft
Top Width	7.3e-8	ft
Critical Depth	2.99	ft
Percent Full	100.0	%
Critical Slope	0.088849	ft/ft
Velocity	28.68	ft/s
Velocity Head	12.78	ft
Specific Energy	15.78	ft
Froude Numbe	5.14e-4	
Maximum Disc	218.08	cfs
Discharge Full	202.73	cfs
Slope Full	0.092400	ft/ft
Flow Type	Subcritical	

Pipe 9
Worksheet for Circular Channel

Project Description	
Worksheet	Pipe 09
Flow Element	Circular Chann
Method	Manning's Forr
Solve For	Discharge

Input Data		
Mannings Coeffic	0.013	
Slope	054540	ft/ft
Depth	1.50	ft
Diameter	18	in

Results		
Discharge	24.53	cfs
Flow Area	1.8	ft²
Wetted Perime	4.71	ft
Top Width	3.65e-8	ft
Critical Depth	1.49	ft
Percent Full	100.0	%
Critical Slope	0.050321	ft/ft
Velocity	13.88	ft/s
Velocity Head	2.99	ft
Specific Energy	4.49	ft
Froude Numbe	3.52e-4	
Maximum Disc	26.39	cfs
Discharge Full	24.53	cfs
Slope Full	0.054540	ft/ft
Flow Type	Subcritical	

Pipe 10
Worksheet for Circular Channel

Project Description	
Worksheet	Pipe 10
Flow Element	Circular Chann
Method	Manning's For
Solve For	Discharge

Input Data		
Mannings Coeffic	0.013	
Slope	040000	ft/ft
Depth	1.50	ft
Diameter	18	in

Results		
Discharge	21.01	cfs
Flow Area	1.8	ft²
Wetted Perime	4.71	ft
Top Width	3.65e-8	ft
Critical Depth	1.47	ft
Percent Full	100.0	%
Critical Slope	0.036005	ft/ft
Velocity	11.89	ft/s
Velocity Head	2.20	ft
Specific Energy	3.70	ft
Froude Numbe	3.01e-4	
Maximum Disc	22.60	cfs
Discharge Full	21.01	cfs
Slope Full	0.040000	ft/ft
Flow Type	Subcritical	

Pipe 11
Worksheet for Circular Channel

Project Description	
Worksheet	Pipe 11
Flow Element	Circular Chann
Method	Manning's For
Solve For	Discharge

Input Data		
Mannings Coeffic	0.013	
Slope	040000	ft/ft
Depth	1.50	ft
Diameter	18	in

Results		
Discharge	21.01	cfs
Flow Area	1.8	ft²
Wetted Perime	4.71	ft
Top Width	3.65e-8	ft
Critical Depth	1.47	ft
Percent Full	100.0	%
Critical Slope	0.036005	ft/ft
Velocity	11.89	ft/s
Velocity Head	2.20	ft
Specific Energy	3.70	ft
Froude Numbe	3.01e-4	
Maximum Disc	22.60	cfs
Discharge Full	21.01	cfs
Slope Full	0.040000	ft/ft
Flow Type	Subcritical	

Pipe 12
Worksheet for Circular Channel

Project Description	
Worksheet	Pipe 12
Flow Element	Circular Chann
Method	Manning's For
Solve For	Discharge

Input Data		
Mannings Coeffic	0.013	
Slope	030000	ft/ft
Depth	1.50	ft
Diameter	18	in

Results		
Discharge	20.81	cfs
Flow Area	1.9	ft²
Wetted Perime	4.33	ft
Top Width	0.50	ft
Critical Depth	1.50	ft
Percent Full	97.3	%
Critical Slope	0.030139	ft/ft
Velocity	11.23	ft/s
Velocity Head	1.96	ft
Specific Energ	3.46	ft
Froude Numbe	1.03	
Maximum Disc	21.05	cfs
Discharge Full	19.57	cfs
Slope Full	0.033929	ft/ft
Flow Type	Supercritical	

Pipe 13
Worksheet for Circular Channel

Project Description	
Worksheet	Pipe 13
Flow Element	Circular Chann
Method	Manning's Forr
Solve For	Discharge

Input Data		
Mannings Coeffic	0.013	
Slope	030000	ft/ft
Depth	1.50	ft
Diameter	18	in

Results		
Discharge	20.81	cfs
Flow Area	1.9	ft²
Wetted Perime	4.33	ft
Top Width	0.50	ft
Critical Depth	1.50	ft
Percent Full	97.3	%
Critical Slope	0.030139	ft/ft
Velocity	11.23	ft/s
Velocity Head	1.96	ft
Specific Energy	3.46	ft
Froude Numbe	1.03	
Maximum Disc	21.05	cfs
Discharge Full	19.57	cfs
Slope Full	0.033929	ft/ft
Flow Type	Supercritical	

Pipe 14
Worksheet for Circular Channel

Project Description	
Worksheet	Pipe 14
Flow Element	Circular Chann
Method	Manning's Forr
Solve For	Discharge

Input Data		
Mannings Coeffic	0.013	
Slope	016000	ft/ft
Depth	2.00	ft
Diameter	24	in

Results		
Discharge	28.61	cfs
Flow Area	3.1	ft²
Wetted Perime	6.28	ft
Top Width	5.96e-8	ft
Critical Depth	1.84	ft
Percent Full	100.0	%
Critical Slope	0.013892	ft/ft
Velocity	9.11	ft/s
Velocity Head	1.29	ft
Specific Energy	3.29	ft
Froude Numbe	2.21e-4	
Maximum Disc	30.78	cfs
Discharge Full	28.61	cfs
Slope Full	0.016000	ft/ft
Flow Type	Subcritical	

Pipe 15
Worksheet for Circular Channel

Project Description	
Worksheet	Pipe 15
Flow Element	Circular Chann
Method	Manning's For
Solve For	Discharge

Input Data		
Mannings Coeffic	0.013	
Slope	009090	ft/ft
Depth	3.00	ft
Diameter	36	in

Results		
Discharge	63.59	cfs
Flow Area	7.1	ft²
Wetted Perime	9.42	ft
Top Width	7.3e-8	ft
Critical Depth	2.56	ft
Percent Full	100.0	%
Critical Slope	0.008496	ft/ft
Velocity	9.00	ft/s
Velocity Head	1.26	ft
Specific Energy	4.26	ft
Froude Numbe	1.61e-4	
Maximum Disc	68.40	cfs
Discharge Full	63.59	cfs
Slope Full	0.009090	ft/ft
Flow Type	Subcritical	

Pipe 16
Worksheet for Circular Channel

Project Description	
Worksheet	Pipe 16
Flow Element	Circular Chann
Method	Manning's For
Solve For	Discharge

Input Data		
Mannings Coeffic	0.013	
Slope	024000	ft/ft
Depth	1.50	ft
Diameter	18	in

Results		
Discharge	16.27	cfs
Flow Area	1.8	ft²
Wetted Perime	4.71	ft
Top Width	3.65e-8	ft
Critical Depth	1.43	ft
Percent Full	100.0	%
Critical Slope	0.020812	ft/ft
Velocity	9.21	ft/s
Velocity Head	1.32	ft
Specific Energy	2.82	ft
Froude Numbe	2.33e-4	
Maximum Disc	17.50	cfs
Discharge Full	16.27	cfs
Slope Full	0.024000	ft/ft
Flow Type	Subcritical	

Pipe 17
Worksheet for Circular Channel

Project Description	
Worksheet	Pipe 17
Flow Element	Circular Chann
Method	Manning's For
Solve For	Discharge

Input Data		
Mannings Coeffic	0.013	
Slope	026700	ft/ft
Depth	2.50	ft
Diameter	30	in

Results		
Discharge	67.02	cfs
Flow Area	4.9	ft²
Wetted Perime	7.85	ft
Top Width	6.66e-8	ft
Critical Depth	2.43	ft
Percent Full	100.0	%
Critical Slope	0.023568	ft/ft
Velocity	13.65	ft/s
Velocity Head	2.90	ft
Specific Energ	5.40	ft
Froude Numbe	2.8e-4	
Maximum Disc	72.09	cfs
Discharge Full	67.02	cfs
Slope Full	0.026700	ft/ft
Flow Type	Subcritical	

Pipe 18
Worksheet for Circular Channel

Project Description	
Worksheet	Pipe 18
Flow Element	Circular Chann
Method	Manning's For
Solve For	Discharge

Input Data		
Mannings Coeffic	0.013	
Slope	038500	ft/ft
Depth	2.78	ft
Diameter	36	in

Results		
Discharge	140.63	cfs
Flow Area	6.8	ft²
Wetted Perime	7.77	ft
Top Width	1.57	ft
Critical Depth	2.97	ft
Percent Full	92.6	%
Critical Slope	0.041079	ft/ft
Velocity	20.58	ft/s
Velocity Head	6.58	ft
Specific Energy	9.36	ft
Froude Numbe	1.74	
Maximum Disc	140.77	cfs
Discharge Full	130.86	cfs
Slope Full	0.044461	ft/ft
Flow Type	Supercritical	

Pipe 19
Worksheet for Circular Channel

Project Description	
Worksheet	Pipe 19
Flow Element	Circular Channe
Method	Manning's Forn
Solve For	Full Flow Diame

Input Data		
Mannings Coeffic	0.013	
Slope	058200	ft/ft
Discharge	57.54	cfs

Results		
Depth	2.04	ft
Diameter	24	in
Flow Area	3.3	ft²
Wetted Perime	0.00	ft
Top Width	0.00	ft
Critical Depth	2.03	ft
Percent Full	100.0	%
Critical Slope	054271	ft/ft
Velocity	17.60	ft/s
Velocity Head	4.82	ft
Specific Energy	6.86	ft
Froude Numbe	0.00	
Maximum Disc	61.90	cfs
Discharge Full	57.54	cfs
Slope Full	058200	ft/ft
Flow Type	N/A	

Pipe 20
Worksheet for Circular Channel

Project Description	
Worksheet	Pipe 20
Flow Element	Circular Chann
Method	Manning's For
Solve For	Discharge

Input Data		
Mannings Coeffic	0.013	
Slope	043750	ft/ft
Depth	3.00	ft
Diameter	36	in

Results		
Discharge	139.50	cfs
Flow Area	7.1	ft²
Wetted Perime	9.42	ft
Top Width	7.3e-8	ft
Critical Depth	2.97	ft
Percent Full	100.0	%
Critical Slope	0.040376	ft/ft
Velocity	19.74	ft/s
Velocity Head	6.05	ft
Specific Energy	9.05	ft
Froude Numbe	3.54e-4	
Maximum Disc	150.06	cfs
Discharge Full	139.50	cfs
Slope Full	0.043750	ft/ft
Flow Type	Subcritical	

Pipe 21
Worksheet for Circular Channel

Project Description	
Worksheet	Pipe 21
Flow Element	Circular Chann
Method	Manning's Forr
Solve For	Discharge

Input Data		
Mannings Coeffic	0.013	
Slope	120000	ft/ft
Depth	1.50	ft
Diameter	18	in

Results		
Discharge	41.63	cfs
Flow Area	1.9	ft²
Wetted Perime	4.33	ft
Top Width	0.50	ft
Critical Depth	1.54	ft
Percent Full	97.3	%
Critical Slope	0.131265	ft/ft
Velocity	22.47	ft/s
Velocity Head	7.85	ft
Specific Energy	9.35	ft
Froude Numbe	2.06	
Maximum Disc	42.11	cfs
Discharge Full	39.14	cfs
Slope Full	0.135717	ft/ft
Flow Type	Supercritical	

EXHIBIT A

Hydrology Map – Post-Project Condition

SUMMARY TABLE

Area Designation	Concentration Point	Post-project Condition Area Acres	Post-project Condition Q_{100} ft³/sec
A	104	27.44	59.5
B	105	3.68	10.9
C	308	70.6	153.8
D	250	89.72	170.7
E	522	57.48	106.7
F	604	31.31	129.0
G	712	71.10	18.4
H	822	12.92	11.9
I	140	17.48	20.7
J	240	17.76	37.4
K	241	27.67	51.0

LEGEND

- DRAINAGE BOUNDARY
- SUBAREA BOUNDARY
- TRACT BOUNDARY
- FLOW PATH
- A-1 / 1.0 — SUBAREA DESIGNATION / SUBAREA (ACRES)
- (00) — HYDROLOGY NODE

SCALE: 1"=200'

200 0 200 400 600

SCALE: 1"=200'

Exhibit A
Pardee-Banning Onsite Hydrology
Post-Project Condition

RBF CONSULTING
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14725 ALTON PARKWAY
IRVINE, CALIFORNIA 92618-2027
949.472.3505 ▪ FAX 949.472.8373 ▪ www.RBF.com

H:\Pdata\65100183\CAD\LAND\Hydro\A-MAP\65183-HY-001 (A-MAP).dwg, 4/1/2008 10:11:53 AM, ACHENG

EXHIBIT B

Proposed Storm Drain Sizing

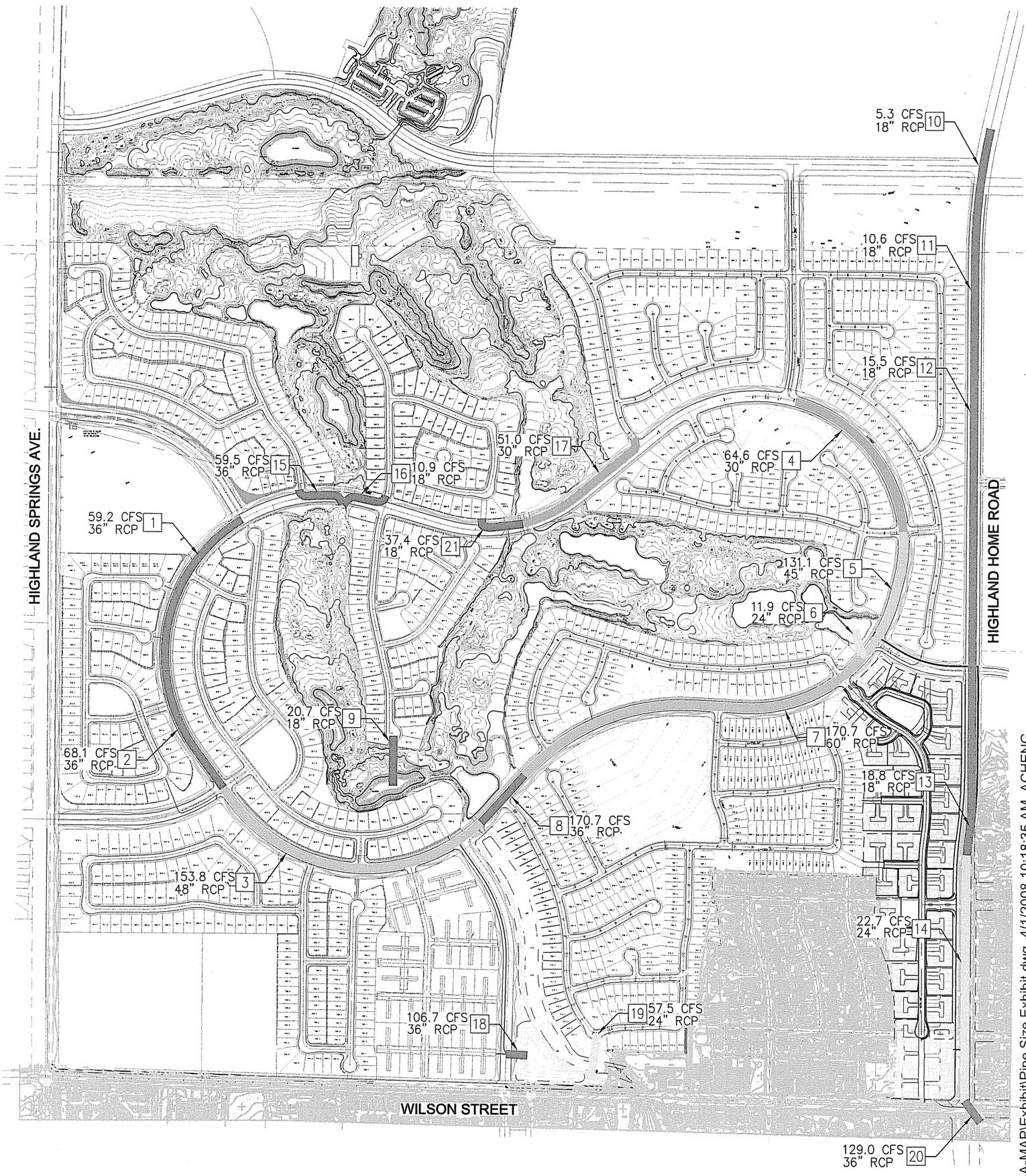

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Exhibit B
PROPOSED STORM DRAIN SIZING

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EXHIBIT C

Hydrologic Soil Map

Land Use and Soil Overlay

It looks better when plot in color!!!

RBF CONSULTING GIS

N

0 2,500 5,000

Feet

VLDR-RC	Rural Mountainous	Water
Medium Density Residential	Conservation	Indian Lands
Medium High Density Residential	Open Space Recreation	City

B Soil - Hydrological Classification

Sources: Riverside County General Plan - 2003
USDA - The Natural Resources Conservation Service
Eagle Aerial

Map Document: (N:\Mdata\10104355\GIS\StormwaterMap.mxd) - 2/23/2006

EXHIBIT D

Standard Intensity – Duration Curves Data

RAINFALL INTENSITY - INCHES PER HOUR

DURATION MINUTES	ANZA FREQUENCY 10 YEAR	ANZA FREQUENCY 100 YEAR	BANNING FREQUENCY 10 YEAR	BANNING FREQUENCY 100 YEAR	BEAUMONT FREQUENCY 10 YEAR	BEAUMONT FREQUENCY 100 YEAR	CALIMESA FREQUENCY 10 YEAR	CALIMESA FREQUENCY 100 YEAR	CANYON LAKE FREQUENCY 10 YEAR	CANYON LAKE FREQUENCY 100 YEAR
5	4.23	6.85	3.32	4.93	3.32	4.93	3.57	5.30	3.07	4.61
6	3.80	6.16	3.02	4.47	3.02	4.47	3.23	4.79	2.81	4.23
7	3.48	5.63	2.78	4.12	2.78	4.12	2.97	4.40	2.61	3.93
8	3.22	5.21	2.59	3.84	2.59	3.84	2.76	4.09	2.45	3.68
9	3.01	4.87	2.43	3.61	2.43	3.61	2.58	3.83	2.31	3.48
10	2.83	4.58	2.30	3.41	2.30	3.41	2.44	3.62	2.20	3.31
11	2.67	4.33	2.19	3.24	2.19	3.24	2.31	3.43	2.10	3.16
12	2.54	4.12	2.09	3.10	2.09	3.10	2.21	3.27	2.01	3.03
13	2.43	3.93	2.00	2.97	2.00	2.97	2.11	3.13	1.94	2.92
14	2.33	3.77	1.92	2.85	1.92	2.85	2.03	3.01	1.87	2.82
15	2.23	3.62	1.86	2.75	1.86	2.75	1.95	2.89	1.81	2.72
16	2.15	3.49	1.79	2.66	1.79	2.66	1.88	2.79	1.75	2.64
17	2.08	3.37	1.74	2.58	1.74	2.58	1.82	2.70	1.70	2.56
18	2.01	3.26	1.68	2.50	1.68	2.50	1.76	2.62	1.66	2.50
19	1.95	3.16	1.64	2.43	1.64	2.43	1.71	2.54	1.62	2.43
20	1.89	3.06	1.59	2.36	1.59	2.36	1.67	2.47	1.58	2.37
22	1.79	2.90	1.51	2.25	1.51	2.25	1.58	2.34	1.51	2.27
24	1.70	2.76	1.45	2.15	1.45	2.15	1.51	2.23	1.44	2.17
26	1.62	2.63	1.39	2.06	1.39	2.06	1.44	2.14	1.39	2.09
28	1.55	2.52	1.33	1.98	1.33	1.98	1.38	2.05	1.34	2.02
30	1.49	2.42	1.29	1.91	1.29	1.91	1.33	1.98	1.30	1.95
32	1.44	2.33	1.24	1.84	1.24	1.84	1.29	1.91	1.26	1.89
34	1.39	2.25	1.20	1.78	1.20	1.78	1.24	1.85	1.22	1.84
36	1.34	2.18	1.17	1.73	1.17	1.73	1.21	1.79	1.19	1.79
38	1.30	2.11	1.13	1.68	1.13	1.68	1.17	1.74	1.16	1.74
40	1.27	2.05	1.10	1.64	1.10	1.64	1.14	1.69	1.13	1.70
45	1.18	1.91	1.04	1.54	1.04	1.54	1.07	1.58	1.07	1.61
50	1.11	1.80	.98	1.45	.98	1.45	1.01	1.49	1.02	1.53
55	1.05	1.70	.93	1.38	.93	1.38	.95	1.42	.97	1.46
60	1.00	1.62	.89	1.32	.89	1.32	.91	1.35	.93	1.40
65	.95	1.55	.85	1.27	.85	1.27	.87	1.29	.89	1.35
70	.91	1.48	.82	1.22	.82	1.22	.84	1.24	.86	1.30
75	.88	1.42	.79	1.17	.79	1.17	.80	1.19	.84	1.26
80	.85	1.37	.76	1.13	.76	1.13	.78	1.15	.81	1.22
85	.82	1.32	.74	1.10	.74	1.10	.75	1.11	.79	1.18
	SLOPE = .580		SLOPE = .530		SLOPE = .530		SLOPE = .550		SLOPE = .480	

RCFC & WCD

HYDROLOGY MANUAL

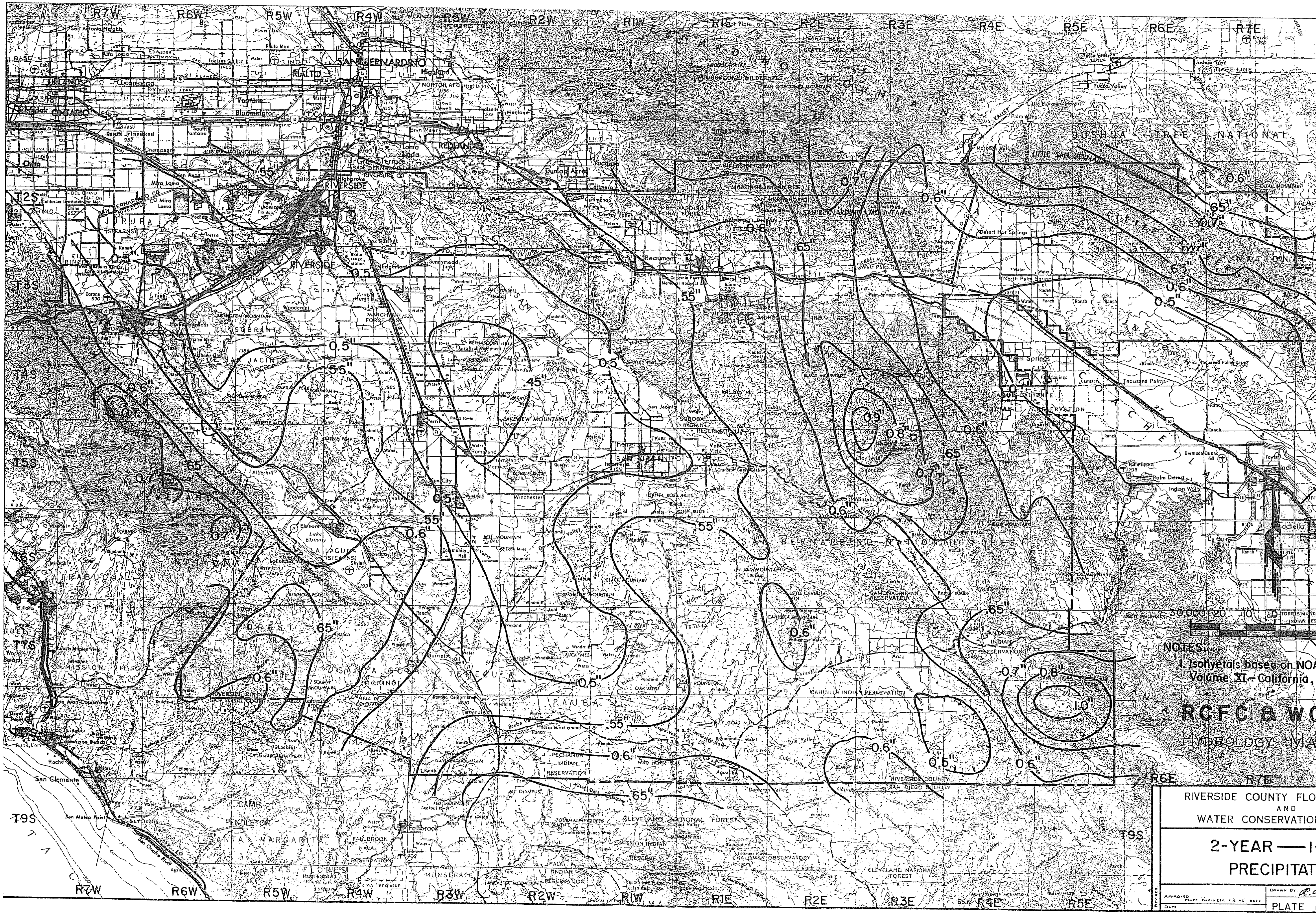
STANDARD
INTENSITY – DURATION
CURVES DATA

PLATE D-4.1 (1 of 6)

EXHIBIT E

2-Yr – 1-Hr Precipitation Map

100-Yr – 1-Hr Precipitation Map


RIVERSIDE COUNTY FLOO
AND
WATER CONSERVATION
2-YEAR — 1-Hr
PRECIPITATIC
PLATE D
NOTES
1. Isohyetals based on NOAA
Volume XI - California, 19
RCFC & WC
HYDROLOGY MAN
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R6W
R5W
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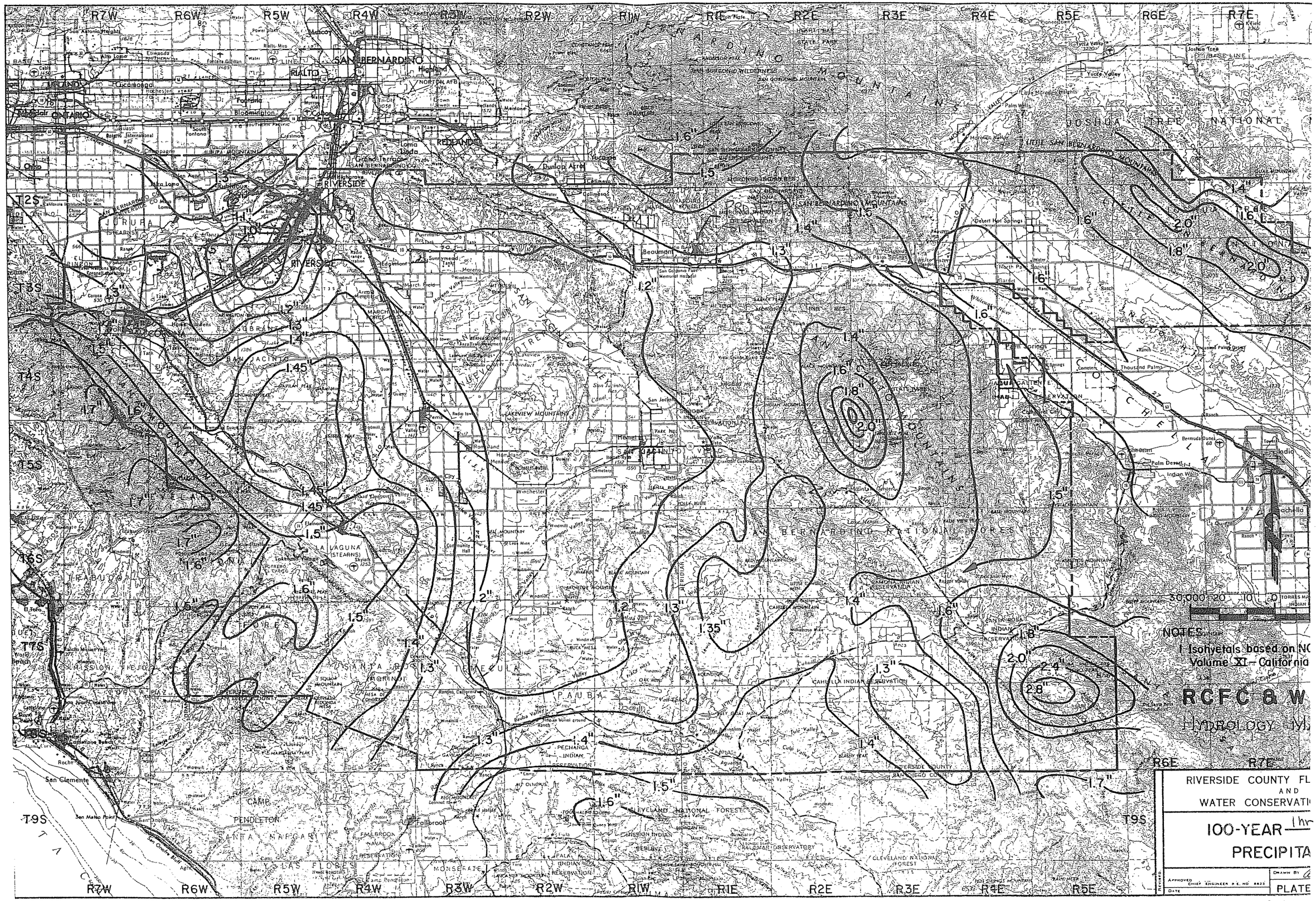
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Banning
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Palm Springs
Thousand Palms
Indio
Coachella
Palm Desert
Indian Wells
Yucca Valley
Joshua Tree
Fontana
Ontario
Chino
Corona
Norco
Mira Loma
Jurupa
Eastvale
Sunnymead
Moreno
Perris
Hemet
San Jacinto
Winchester
Lake Elsinore
Wildomar
Murrieta
Temecula
Fallbrook
San Clemente
Camp Pendleton
Oceanside
Escondido
Vista
Carlsbad
San Marcos
Encinitas
Solana Beach
Del Mar
La Jolla
Rancho California
Pechanga Indian Reservation
Cahuilla Indian Reservation
Agua Caliente Indian Reservation
Morongo Indian Reservation
Cabazon Indian Reservation
Torres Martinez Indian Reservation
Twenty-nine Palms Indian Reservation
Santa Rosa Indian Reservation
Los Coyotes Indian Reservation
Mission Indian Reservation
Pala Indian Reservation
San Bernardino National Forest
Cleveland National Forest
Joshua Tree National Monument
San Gorgonio Wilderness
San Jacinto Wilderness
San Bernardino Mountains
San Jacinto Mountains
Santa Ana Mountains
Box Spring Mountains
Little San Bernardino Mountains
Lake Mathews
Lake Perris
Lake Skinner
Vail Lake
Diamond Valley Lake
Santa Ana River
Temecula Creek
Murrieta Creek
Whitewater River
Colorado River Aqueduct
Metropolitan Water District Aqueduct
Eastern Municipal Water District Aqueduct
Western Municipal Water District Aqueduct
1.6"
1.5
1.4"
1.3"
1.2"
1.45"
1.7"
1.8"
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NOTES
1. Isohyetals based on NC
Volume XI - California
RCFC & W
HYDROLOGY M
RIVERSIDE COUNTY FL
AND
WATER CONSERVATI
100-YEAR 1hr
PRECIPITA
APPROVED CHIEF ENGINEER R.E. NO. 6822
DATE
DRAWN BY
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