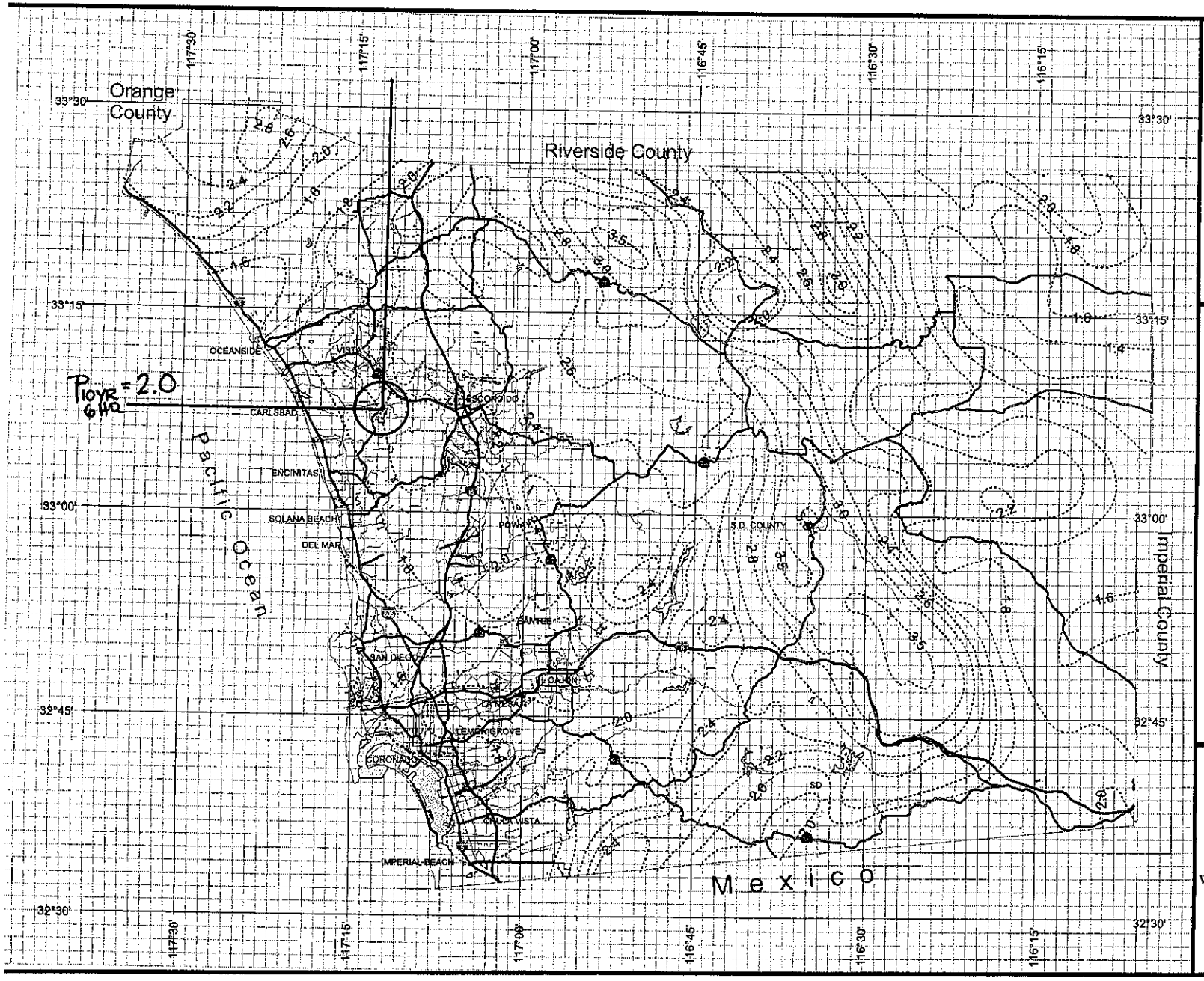

County of San Diego Hydrology Manual

Rainfall Isopluvials

10 Year Rainfall Event - 6 Hours

Isopluvial (inches)

DPW GIS
Department of Public Works Geographic Information Services

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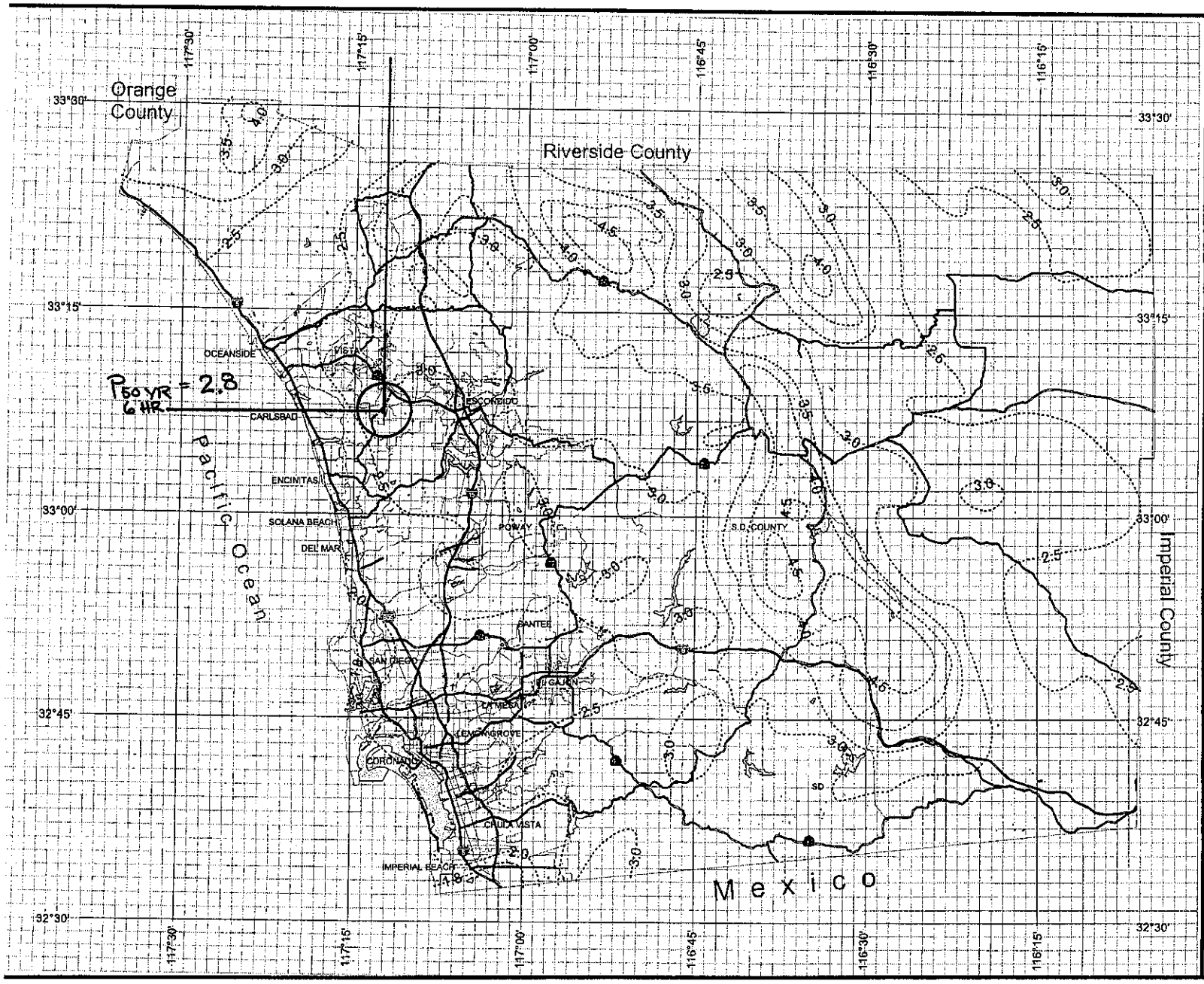

County of San Diego Hydrology Manual

Rainfall Isopluvials

50 Year Rainfall Event - 6 Hours

Isopluvial (inches)

DPW GIS
Department of Public Works
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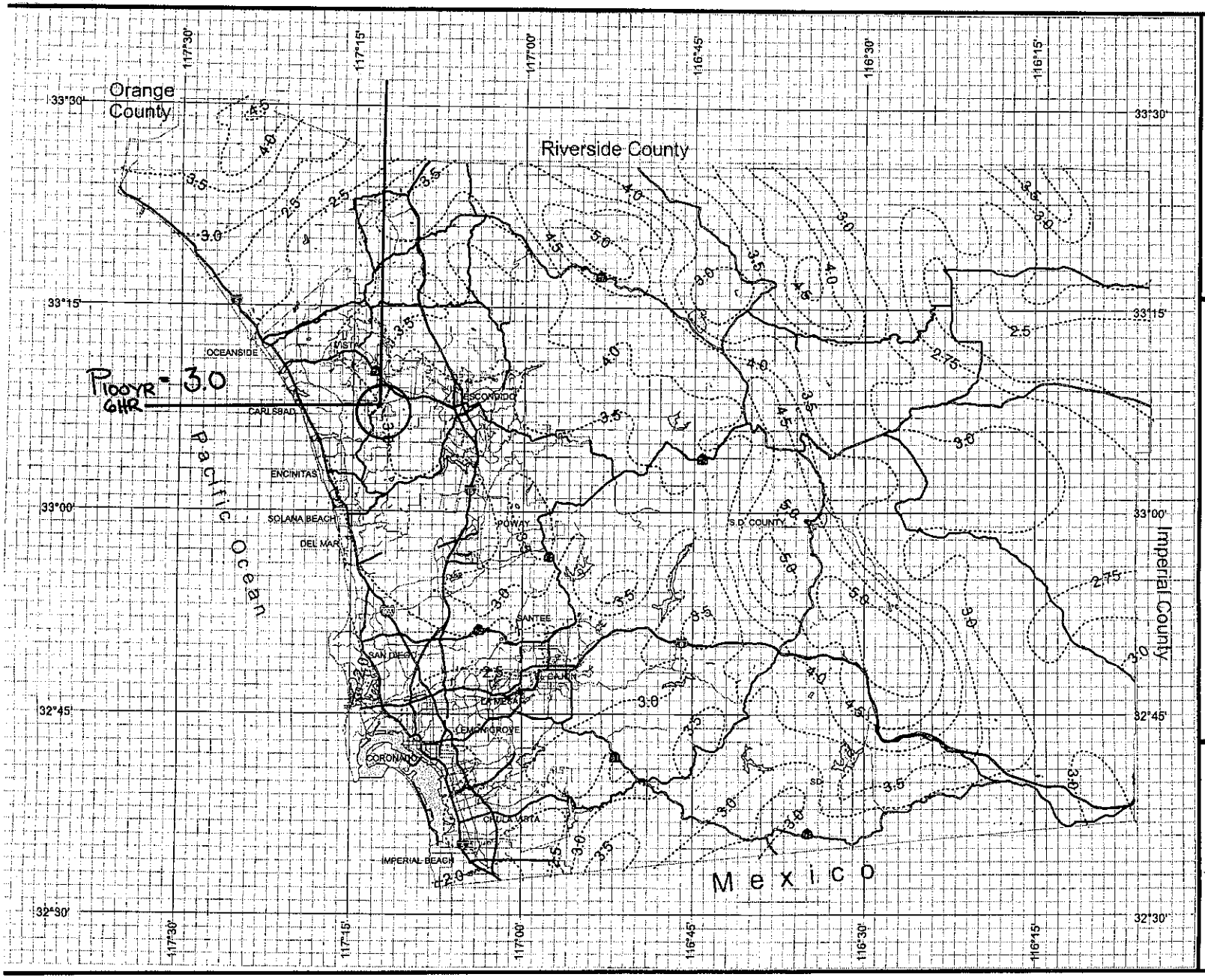

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)

DPW GIS
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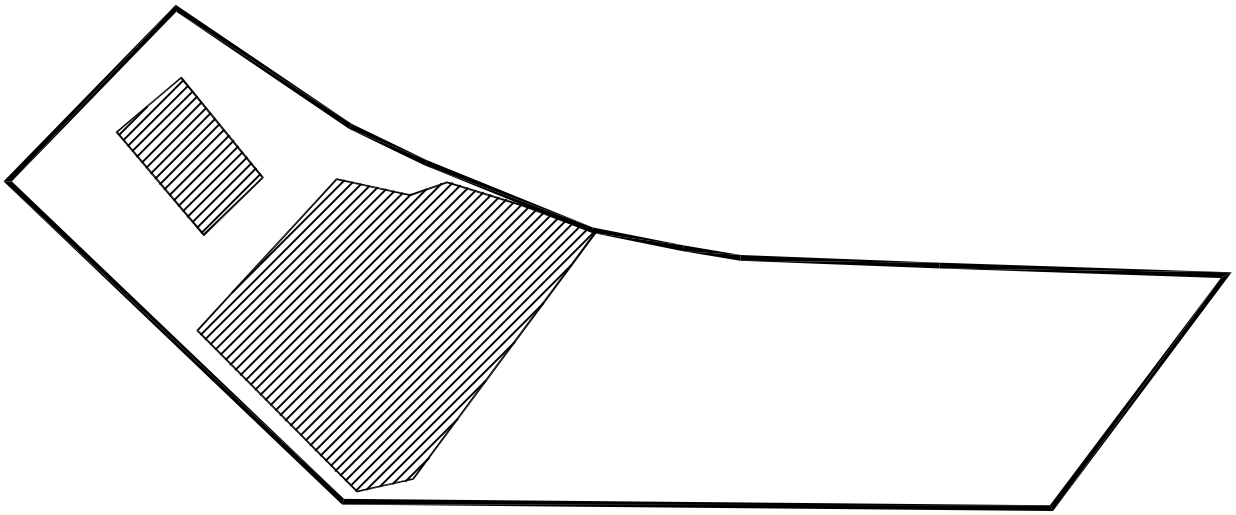
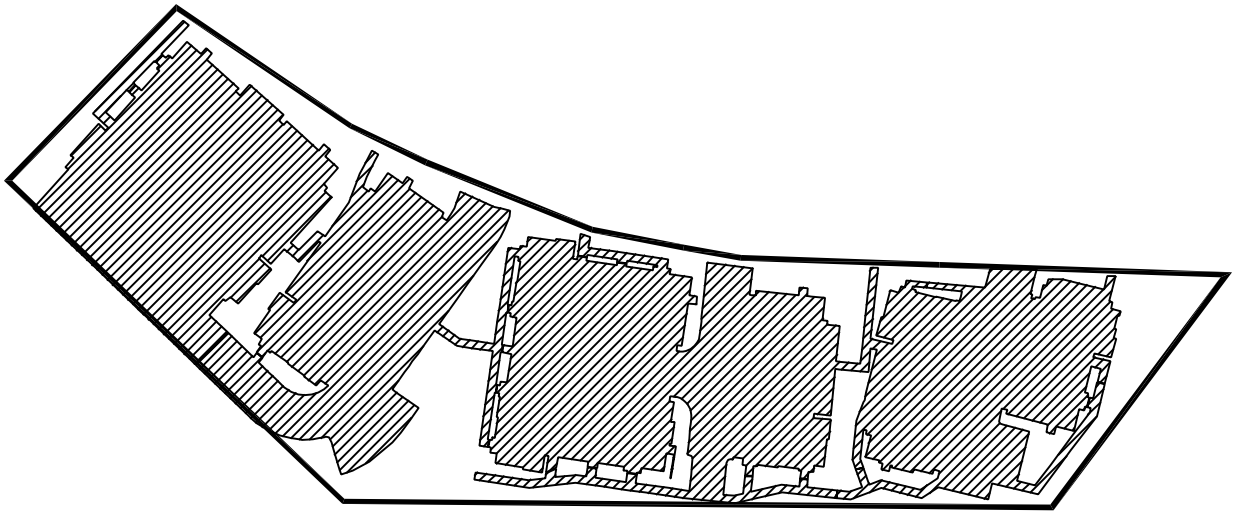


EXISTING
TOTAL AREA = 2 AC
IMPERVIOUS = 0.5 AC = 25%
PERVIOUS = 1.5 AC = 75%



EXISTING
TOTAL AREA = 2 AC
IMPERVIOUS = 1.3 AC = 65%
PERVIOUS = 0.7 AC = 35%

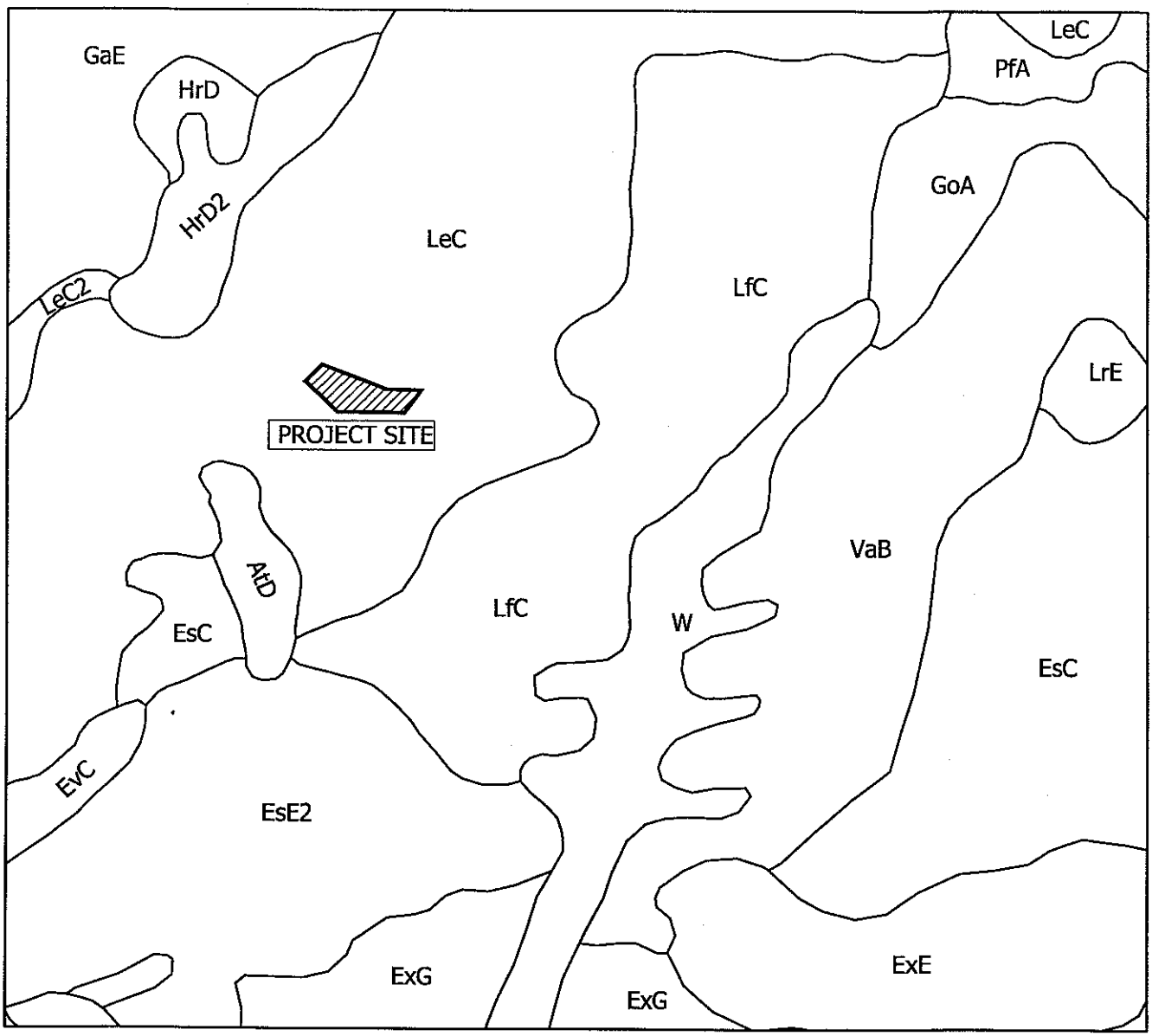
Not To Scale

PROJECT NAME
IMPERVIOUS AREAS

Lundstrom +associates
| PLANNING | CIVIL ENGINEERING | LAND SURVEYING |
1764 San Diego Avenue, Suite 200, San Diego, CA 92110
Tel: 619.641.5900 Fax: 619.641.5910 www.lundstrom.cc

X:\PROJ\146-33\DWG\WATER RESOURCES\14633IMP02.DWG

SHEET NO. 23 & 34
SAN DIEGO AREA, CALIFORNIA
(SAN MARCOS &
RANCHO SANTA FE QUADRANGLES)



SOIL TYPE	MAP SYMBOL	HYDROLOGIC SOIL GROUP	AREA (AC)
Las Flores loamy fine sand, 2 to 9 percent slopes	LeC	D	2.1

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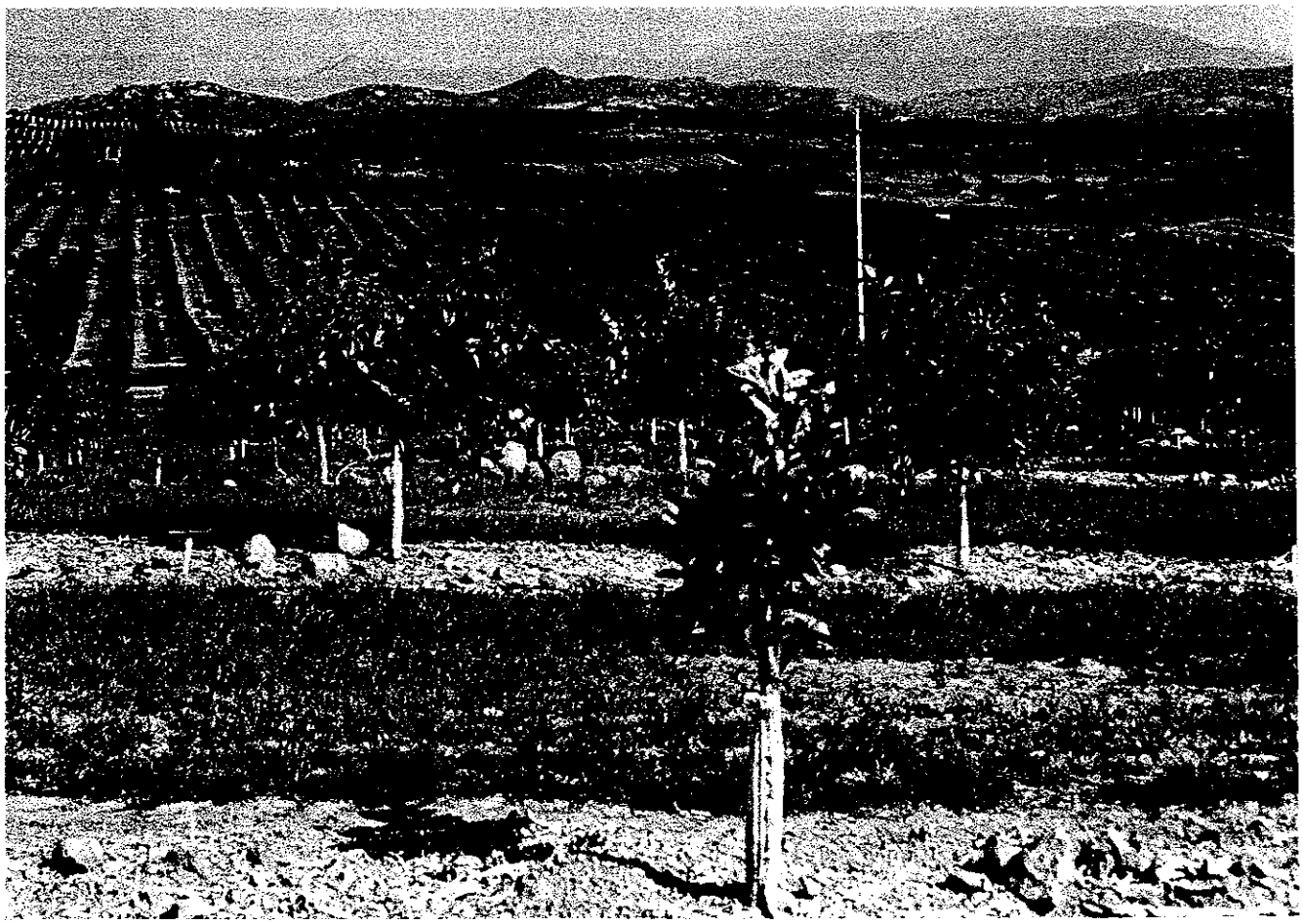
LAGO DE SAN MARCOS
SOILS MAP

x:\proj\146-33\dwg\Water Resources\14633soil01.dwg

PART II

SOIL SURVEY

San Diego Area, California



UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service and Forest Service
in cooperation with
UNIVERSITY OF CALIFORNIA AGRICULTURAL EXPERIMENT STATION
UNITED STATES DEPARTMENT OF THE INTERIOR
Bureau of Indian Affairs
DEPARTMENT OF THE NAVY
United States Marine Corps

Issued December 1973

TABLE 11.--INTERPRETATIONS FOR LAND MANAGEMENT--Continued

Map symbol	Soil	Hydrologic group	Erodibility	Limitations for conversion from brush to grass
HnG	Holland stony fine sandy loam, 30 to 60 percent slopes.	C	Severe 1-----	Moderate.
HoC	Holland fine sandy loam, deep, 2 to 9 percent slopes.	C	Severe 16----	Slight.
HrC	Huerhuero loam, 2 to 9 percent slopes----------	D	Severe 9-----	Slight.
HrC2	Huerhuero loam, 5 to 9 percent slopes, eroded----------	D	Severe 9-----	Slight.
HrD	Huerhuero loam, 9 to 15 percent slopes----------	D	Severe 9-----	Slight.
HrD2	Huerhuero loam, 9 to 15 percent slopes, eroded----------	D	Severe 9-----	Slight.
HrE2	Huerhuero loam, 15 to 30 percent slopes, eroded----------	D	Severe 9-----	Slight.
HuC	Huerhuero-Urban land complex, 2 to 9 percent slopes:			
	Huerhuero----------	D		
	Urban land----------	D		
HuE	Huerhuero-Urban land complex, 9 to 30 percent slopes:			
	Huerhuero----------	D		
	Urban land----------	D		
InA	Indio silt loam, 0 to 2 percent slopes----------	C	Severe 16	
InB	Indio silt loam, 2 to 5 percent slopes----------	C	Severe 16	
IoA	Indio silt loam, saline, 0 to 2 percent slopes----------	C	Severe 16	
IsA	Indio silt loam, dark variant----------	C	Severe 16	
KcC	Kitchen Creek loamy coarse sand, 5 to 9 percent slopes.	B	Severe 2-----	Slight. 4/
KcD2	Kitchen Creek loamy coarse sand, 9 to 15 percent slopes, eroded.	B	Severe 2-----	Slight. 4/
LaE2	La Posta loamy coarse sand, 5 to 30 percent slopes, eroded.	A	Severe 2-----	Slight. 4/
LaE3	La Posta loamy coarse sand, 5 to 30 percent slopes, severely eroded.	A	Severe 2-----	Severe. 4/
LcE	La Posta rocky loamy coarse sand, 5 to 30 percent slopes.	A	Severe 2-----	Moderate. 4/
LcE2	La Posta rocky loamy coarse sand, 5 to 30 percent slopes, eroded.	A	Severe 2-----	Moderate. 4/
LcF2	La Posta rocky loamy coarse sand, 30 to 50 percent slopes, eroded.	A	Severe 1-----	Moderate. 4/
LdE	La Posta-Sheephead complex, 9 to 30 percent slopes:			
	La Posta----------	A	Severe 2-----	Moderate. 4/
	Sheephead----------	C	Severe 2-----	Moderate. 4/
LdG	La Posta-Sheephead complex, 30 to 65 percent slopes:			
	La Posta----------	A	Severe 1-----	Moderate. 4/
	Sheephead----------	C	Severe 1-----	Moderate. 4/
LeC	Las Flores loamy fine sand, 2 to 9 percent slopes----------	D	Severe 2-----	Slight.
LeC2	Las Flores loamy fine sand, 5 to 9 percent slopes, eroded.	D	Severe 2-----	Slight.
LeD	Las Flores loamy fine sand, 9 to 15 percent slopes----------	D	Severe 2-----	Slight.
LeD2	Las Flores loamy fine sand, 9 to 15 percent slopes, eroded.	D	Severe 2-----	Slight.
LeE	Las Flores loamy fine sand, 15 to 30 percent slopes----------	D	Severe 2-----	Slight.
LeE2	Las Flores loamy fine sand, 15 to 30 percent slopes, eroded.	D	Severe 2-----	Slight.
LeE3	Las Flores loamy fine sand, 9 to 30 percent slopes, severely eroded.	D	Severe 2-----	Severe.
LfC	Las Flores-Urban land complex, 2 to 9 percent slopes:			
	Las Flores----------	D		
	Urban land----------	D		

See footnotes at end of table.

SanGIS Interactive Mapping - Microsoft Internet Explorer

Address http://www.sangis.org/SangisInteractive/viewer/Viewer.asp

SanGIS Interactive Map

Find Address | Find Parcel | Find Intersection | Find Zip Code

Zoom to Area: Select an Area

Print | Show Vicinity | Zoom In | Zoom Out | Back | Pan | Full County | Information | Clear | Help

Map Type | Community | Flood Zones | Property | Stormwater | Custom Map

2215002800

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Parcel Results - Microsoft Internet Expl...

Number	1699
Street	LAKE SAN MARCOS
City	CN
Zip	92069
Land Value	345000
Improv Value	0
Total Value	345000

Layers Found at Parcel

	Municipal
City Name	S.D. COUNTY
FEMA Community Panel	060284
	Vegetation
Category	Non-Native Vegetation, Developed or Unvegetated Habitat
Legend	Urban/Developed

Tool: Identify

Small Map

Checked = Draw Layer
Note: Some layers may not draw at all scales

Transportation
Water Features
MSCP

Other Layers
Parcels
Vegetation
Zip Codes
Municipal

Internet

start | Autodesk Map - [x:\p... | 14633Drainage01.do... | Document2 - Microsof... | Water Resources | SanGIS Interactive M... | Parcel Results - Micro... | 11:23 AM

```
____________________________________________________________________
**********************************************************************

              RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
              Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                           2003,1985,1981 HYDROLOGY MANUAL
           (c) Copyright 1982-2003 Advanced Engineering Software (aes)
               Ver. 1.5A Release Date: 01/01/2003  License ID 1553

                                Analysis prepared by:


   ************************** DESCRIPTION OF STUDY
**************************
   * LAGO DE SAN MARCOS
         *
   * 10-YEAR STORM EVENT - EXISTING CONDITION
         *
   * JN 146-32
         *
**********************************************************************

     FILE NAME: C:\146EX010.DAT
     TIME/DATE OF STUDY: 13:21 07/22/2004
----------------------------------------------------------------------
     USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------
     2003 SAN DIEGO MANUAL CRITERIA

     USER SPECIFIED STORM EVENT(YEAR) =  10.00
     6-HOUR DURATION PRECIPITATION (INCHES) =   2.000
     SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
     SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE
= 0.90
     SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
     NOTE: CONSIDER ALL CONFLUENCE STREAM COMBINATIONS
           FOR ALL 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   40.0     20.0    0.020/0.020/0.020   0.67    2.00 0.0313
0.167 0.0150
    3   60.0     30.0    0.020/0.020/0.020   0.67    2.00 0.0313
0.167 0.0150

    GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
      1. Relative Flow-Depth =  0.40 FEET
         as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
      2. (Depth)*(Velocity) Constraint =  4.0 (FT*FT/S)
    *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
     OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*


**********************************************************************
    FLOW PROCESS FROM NODE    118.00 TO NODE    117.00 IS CODE =  21
----------------------------------------------------------------------
    >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
======================================================================
    STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  98
    INITIAL SUBAREA FLOW-LENGTH(FEET) =    80.00
    UPSTREAM ELEVATION(FEET) =    623.70
    DOWNSTREAM ELEVATION(FEET) =    621.00
    ELEVATION DIFFERENCE(FEET) =      2.70
    SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.469
      10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.269
    NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
    SUBAREA RUNOFF(CFS) =      0.32
    TOTAL AREA(ACRES) =      0.07   TOTAL RUNOFF(CFS) =      0.32


**********************************************************************
    FLOW PROCESS FROM NODE    117.00 TO NODE    114.00 IS CODE =  62
----------------------------------------------------------------------
    >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
    >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
======================================================================
    UPSTREAM ELEVATION(FEET) =  621.00  DOWNSTREAM ELEVATION(FEET) =
620.00
    STREET LENGTH(FEET) =    30.00   CURB HEIGHT(INCHES) =  8.0
    STREET HALFWIDTH(FEET) = 40.00
```

```
    DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
    INSIDE STREET CROSSFALL(DECIMAL) =  0.020
    OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

      **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.41
      STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
      STREET FLOW DEPTH(FEET) =  0.20
      HALFSTREET FLOOD WIDTH(FEET) =    2.00
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.96
      PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.79
    STREET FLOW TRAVEL TIME(MIN.) =   0.13   Tc(MIN.) =   2.59
      10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.269
    NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
    STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  98
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
    SUBAREA AREA(ACRES) =    0.04      SUBAREA RUNOFF(CFS) =    0.18
    TOTAL AREA(ACRES) =      0.11        PEAK FLOW RATE(CFS) =
 0.50

    END OF SUBAREA STREET FLOW HYDRAULICS:
    DEPTH(FEET) = 0.20   HALFSTREET FLOOD WIDTH(FEET) =   2.00
    FLOW VELOCITY(FEET/SEC.) =  3.96   DEPTH*VELOCITY(FT*FT/SEC.) =
 0.79
    LONGEST FLOWPATH FROM NODE    118.00 TO NODE    114.00 =   110.00
 FEET.


 ****************************************************************************
    FLOW PROCESS FROM NODE    114.00 TO NODE    114.00 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.) =   2.59
    RAINFALL INTENSITY(INCH/HR) =   5.27
    TOTAL STREAM AREA(ACRES) =     0.11
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.50


 ****************************************************************************
    FLOW PROCESS FROM NODE    116.00 TO NODE    115.00 IS CODE =  21

```



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

 ============================================================================
    RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  82
    INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
    UPSTREAM ELEVATION(FEET) =    621.40
    DOWNSTREAM ELEVATION(FEET) =    621.00
    ELEVATION DIFFERENCE(FEET) =      0.40
    SUBAREA OVERLAND TIME OF FLOW(MIN.) =   10.881
    WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
             THE MAXIMUM OVERLAND FLOW LENGTH =    52.86
             (Reference: Table 3-1B of Hydrology Manual)
             THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc
 CALCULATION!
       10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.191
    SUBAREA RUNOFF(CFS) =      0.13
    TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.13


 ****************************************************************************
    FLOW PROCESS FROM NODE    115.00 TO NODE    114.00 IS CODE =  51

 ----------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

 ============================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    621.00  DOWNSTREAM(FEET) =
 620.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =    70.00   CHANNEL SLOPE =
 0.0143
    CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.045   MAXIMUM DEPTH(FEET) =   2.00
      10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.901
    RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  82
    TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.17
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.67
    AVERAGE FLOW DEPTH(FEET) =   0.08   TRAVEL TIME(MIN.) =   1.73
    Tc(MIN.) =  12.61
    SUBAREA AREA(ACRES) =     0.07       SUBAREA RUNOFF(CFS) =    0.08
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
    TOTAL AREA(ACRES) =      0.17         PEAK FLOW RATE(CFS) =
 0.20

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   0.71
    LONGEST FLOWPATH FROM NODE    116.00 TO NODE    114.00 =   140.00
 FEET.

```

```
****************************************************************************
  FLOW PROCESS FROM NODE    114.00 TO NODE    114.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =  12.61
  RAINFALL INTENSITY(INCH/HR) =   2.90
  TOTAL STREAM AREA(ACRES) =     0.17
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.20

  ** CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY      AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
      1        0.50     2.59        5.269          0.11
      2        0.20    12.61        2.901          0.17

  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        0.55     2.59       5.269
      2        0.48    12.61       2.901

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      0.55   Tc(MIN.) =    2.59
  TOTAL AREA(ACRES) =      0.28
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    114.00 =   140.00
FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    114.00 TO NODE    106.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  620.00  DOWNSTREAM ELEVATION(FEET) =
601.00
  STREET LENGTH(FEET) =   260.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 40.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020
```



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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.19
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.20
    HALFSTREET FLOOD WIDTH(FEET) =    2.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.87
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.16
  STREET FLOW TRAVEL TIME(MIN.) =   0.74   Tc(MIN.) =   3.33
    10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.269
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  98
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.730
  SUBAREA AREA(ACRES) =    0.28      SUBAREA RUNOFF(CFS) =    1.28
  TOTAL AREA(ACRES) =      0.56        PEAK FLOW RATE(CFS) =
2.16

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   4.85
  FLOW VELOCITY(FEET/SEC.) =  5.08   DEPTH*VELOCITY(FT*FT/SEC.) =
1.30
  LONGEST FLOWPATH FROM NODE    116.00 TO NODE    106.00 =   400.00
FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 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.) =   3.33
  RAINFALL INTENSITY(INCH/HR) =   5.27
  TOTAL STREAM AREA(ACRES) =     0.56
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.16

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    110.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
```

```
    RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  82
    INITIAL SUBAREA FLOW-LENGTH(FEET) =    65.00
    UPSTREAM ELEVATION(FEET) =    618.00
    DOWNSTREAM ELEVATION(FEET) =    614.50
    ELEVATION DIFFERENCE(FEET) =      3.50
    SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.713
      10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.835
    SUBAREA RUNOFF(CFS) =      0.20
    TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.20


****************************************************************************
    FLOW PROCESS FROM NODE    110.00 TO NODE    108.00 IS CODE =  51

----------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

============================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    614.50  DOWNSTREAM(FEET) =
611.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   110.00   CHANNEL SLOPE =
0.0318
    CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.045   MAXIMUM DEPTH(FEET) =   2.00
      10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.162
    RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  82
    TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.45
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.23
    AVERAGE FLOW DEPTH(FEET) =   0.11   TRAVEL TIME(MIN.) =   1.50
    Tc(MIN.) =   7.21
    SUBAREA AREA(ACRES) =     0.29       SUBAREA RUNOFF(CFS) =    0.49
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
    TOTAL AREA(ACRES) =      0.39         PEAK FLOW RATE(CFS) =
0.67

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   1.45
    LONGEST FLOWPATH FROM NODE    112.00 TO NODE    108.00 =   175.00
FEET.


****************************************************************************
    FLOW PROCESS FROM NODE    108.00 TO NODE    106.00 IS CODE =  51

----------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

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



```
    ELEVATION DATA: UPSTREAM(FEET) =    611.00  DOWNSTREAM(FEET) =
601.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   170.00   CHANNEL SLOPE =
0.0588
    CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
    MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
      10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.968
    STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  98
    TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.71
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.13
    AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   0.55
    Tc(MIN.) =   7.76
    SUBAREA AREA(ACRES) =     0.61       SUBAREA RUNOFF(CFS) =    2.11
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.691
    TOTAL AREA(ACRES) =      1.00         PEAK FLOW RATE(CFS) =
2.74

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.14   FLOW VELOCITY(FEET/SEC.) =   5.96
    LONGEST FLOWPATH FROM NODE    112.00 TO NODE    106.00 =   345.00
FEET.


****************************************************************************
    FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =   1

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

============================================================================
    TOTAL NUMBER OF STREAMS =  2
    CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
    TIME OF CONCENTRATION(MIN.) =   7.76
    RAINFALL INTENSITY(INCH/HR) =   3.97
    TOTAL STREAM AREA(ACRES) =     1.00
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.74

    ** CONFLUENCE DATA **
    STREAM     RUNOFF      Tc      INTENSITY      AREA
    NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
        1        2.16     3.33        5.269         0.56
        1        1.14    13.35        2.797         0.56
        2        2.74     7.76        3.968         1.00

    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        3.33     3.33       5.269
```

```
        2        4.36     7.76       3.968
        3        3.08    13.35       2.797

    COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
    PEAK FLOW RATE(CFS) =      4.36   Tc(MIN.) =    7.76
    TOTAL AREA(ACRES) =      1.56
    LONGEST FLOWPATH FROM NODE    116.00 TO NODE    106.00 =   400.00
FEET.

****************************************************************************
    FLOW PROCESS FROM NODE    106.00 TO NODE    100.00 IS CODE =  62
----------------------------------------------------------------------------
    >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
    >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
    UPSTREAM ELEVATION(FEET) =  601.00  DOWNSTREAM ELEVATION(FEET) =
581.00
    STREET LENGTH(FEET) =   330.00   CURB HEIGHT(INCHES) =  8.0
    STREET HALFWIDTH(FEET) = 40.00

    DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
    INSIDE STREET CROSSFALL(DECIMAL) =  0.020
    OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

      **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.95
      STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
      STREET FLOW DEPTH(FEET) =  0.33
      HALFSTREET FLOOD WIDTH(FEET) =    8.57
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.36
      PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.77
    STREET FLOW TRAVEL TIME(MIN.) =   1.03   Tc(MIN.) =   8.79
      10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.663
    STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  98
    AREA-AVERAGE RUNOFF COEFFICIENT =  1.094
    SUBAREA AREA(ACRES) =    0.37      SUBAREA RUNOFF(CFS) =    1.18
    TOTAL AREA(ACRES) =      1.93        PEAK FLOW RATE(CFS) =
7.74

    END OF SUBAREA STREET FLOW HYDRAULICS:
    DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  10.61
    FLOW VELOCITY(FEET/SEC.) =  5.88   DEPTH*VELOCITY(FT*FT/SEC.) =
2.18
    ** PEAK FLOW RATE TABLE **
```



```
    STREAM   RUNOFF       Tc
    NUMBER    (CFS)     (MIN.)
       1       11.13       4.40
       2        7.74       8.78
       3        5.62      14.44
    NEW PEAK FLOW DATA ARE:
    PEAK FLOW RATE(CFS) =    11.13  Tc(MIN.) =   4.40
    LONGEST FLOWPATH FROM NODE    116.00 TO NODE    100.00 =   730.00
FEET.

****************************************************************************
    FLOW PROCESS FROM NODE    100.00 TO NODE    100.00 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.) =   4.40
    RAINFALL INTENSITY(INCH/HR) =   5.27
    TOTAL STREAM AREA(ACRES) =     1.93
    PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.13

****************************************************************************
    FLOW PROCESS FROM NODE    104.00 TO NODE    102.00 IS CODE =  21
----------------------------------------------------------------------------
    >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
    RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  82
    INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
    UPSTREAM ELEVATION(FEET) =    604.00
    DOWNSTREAM ELEVATION(FEET) =    594.50
    ELEVATION DIFFERENCE(FEET) =      9.50
    SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.865
      10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.754
    SUBAREA RUNOFF(CFS) =      0.25
    TOTAL AREA(ACRES) =      0.13   TOTAL RUNOFF(CFS) =      0.25

****************************************************************************
    FLOW PROCESS FROM NODE    102.00 TO NODE    100.00 IS CODE =  51
----------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
```

```
    ELEVATION DATA: UPSTREAM(FEET) =    594.50  DOWNSTREAM(FEET) =
581.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   360.00   CHANNEL SLOPE =
0.0375
    CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
    MANNING'S FACTOR = 0.045   MAXIMUM DEPTH(FEET) =   2.00
      10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.543
    RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  82
    TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.92
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.77
    AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =   3.39
    Tc(MIN.) =   9.25
    SUBAREA AREA(ACRES) =     0.91       SUBAREA RUNOFF(CFS) =    1.32
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
    TOTAL AREA(ACRES) =      1.04         PEAK FLOW RATE(CFS) =
1.51

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.21   FLOW VELOCITY(FEET/SEC.) =   2.09
    LONGEST FLOWPATH FROM NODE    104.00 TO NODE    100.00 =   460.00
FEET.

****************************************************************************
    FLOW PROCESS FROM NODE    100.00 TO NODE    100.00 IS CODE =   1
----------------------------------------------------------------------------
    >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
    >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
    TOTAL NUMBER OF STREAMS =  2
    CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
    TIME OF CONCENTRATION(MIN.) =   9.25
    RAINFALL INTENSITY(INCH/HR) =   3.54
    TOTAL STREAM AREA(ACRES) =     1.04
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.51

    ** CONFLUENCE DATA **
    STREAM     RUNOFF      Tc      INTENSITY      AREA
    NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
        1       11.13     4.40        5.269          1.93
        1        7.74     8.78        3.664          1.93
        1        5.62    14.44        2.659          1.93
        2        1.51     9.25        3.543          1.04

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

    ** PEAK FLOW RATE TABLE **
    STREAM     RUNOFF      Tc      INTENSITY
    NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
```



```
        1       11.85     4.40       5.269
        2        9.17     8.78       3.664
        3        8.99     9.25       3.543
        4        6.75    14.44       2.659

    COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
    PEAK FLOW RATE(CFS) =     11.85   Tc(MIN.) =    4.40
    TOTAL AREA(ACRES) =      2.97
    LONGEST FLOWPATH FROM NODE    116.00 TO NODE    100.00 =   730.00
FEET.
                                                                          
============================================================================
    END OF STUDY SUMMARY:
    TOTAL AREA(ACRES)     =      2.97  TC(MIN.) =      4.40
    PEAK FLOW RATE(CFS)   =     11.85
    *** PEAK FLOW RATE TABLE ***
           Q(CFS)   Tc(MIN.)
    1       11.85       4.40
    2        9.17       8.78
    3        8.99       9.25
    4        6.75      14.44
                                                                          
============================================================================
                                                                          
============================================================================
    END OF RATIONAL METHOD ANALYSIS
```

```
____________________________________________________________________
**********************************************************************

              RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
              Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                           2003,1985,1981 HYDROLOGY MANUAL
           (c) Copyright 1982-2003 Advanced Engineering Software (aes)
               Ver. 1.5A Release Date: 01/01/2003  License ID 1553

                                Analysis prepared by:


   ************************** DESCRIPTION OF STUDY
**************************
   * LAGO DE SAN MARCOS
         *
   * 50-YEAR STORM EVENT - EXISTING CONDITION
         *
   * JN 146-32
         *
**********************************************************************

     FILE NAME: C:\146EX050.DAT
     TIME/DATE OF STUDY: 14:40 07/21/2004
----------------------------------------------------------------------
     USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------
     2003 SAN DIEGO MANUAL CRITERIA

     USER SPECIFIED STORM EVENT(YEAR) =  50.00
     6-HOUR DURATION PRECIPITATION (INCHES) =   2.800
     SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
     SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE
= 0.90
     SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
     NOTE: CONSIDER ALL CONFLUENCE STREAM COMBINATIONS
           FOR ALL 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   40.0     20.0    0.020/0.020/0.020   0.67    2.00 0.0313
0.167 0.0150
    3   60.0     30.0    0.020/0.020/0.020   0.67    2.00 0.0313
0.167 0.0150

    GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
      1. Relative Flow-Depth =  0.40 FEET
         as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
      2. (Depth)*(Velocity) Constraint =  4.0 (FT*FT/S)
    *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
     OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*


**********************************************************************
    FLOW PROCESS FROM NODE    118.00 TO NODE    117.00 IS CODE =  21
----------------------------------------------------------------------
    >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
======================================================================
    STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  98
    INITIAL SUBAREA FLOW-LENGTH(FEET) =    80.00
    UPSTREAM ELEVATION(FEET) =    623.70
    DOWNSTREAM ELEVATION(FEET) =    621.00
    ELEVATION DIFFERENCE(FEET) =      2.70
    SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.469
      50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
    NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
    SUBAREA RUNOFF(CFS) =      0.45
    TOTAL AREA(ACRES) =      0.07   TOTAL RUNOFF(CFS) =      0.45


**********************************************************************
    FLOW PROCESS FROM NODE    117.00 TO NODE    114.00 IS CODE =  62
----------------------------------------------------------------------
    >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
    >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
======================================================================
    UPSTREAM ELEVATION(FEET) =  621.00  DOWNSTREAM ELEVATION(FEET) =
620.00
    STREET LENGTH(FEET) =    30.00   CURB HEIGHT(INCHES) =  8.0
    STREET HALFWIDTH(FEET) = 40.00
```

```
    DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
    INSIDE STREET CROSSFALL(DECIMAL) =  0.020
    OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

      **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.58
      STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
      STREET FLOW DEPTH(FEET) =  0.20
      HALFSTREET FLOOD WIDTH(FEET) =    2.00
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.96
      PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.79
    STREET FLOW TRAVEL TIME(MIN.) =   0.13   Tc(MIN.) =   2.59
      50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
    NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
    STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  98
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
    SUBAREA AREA(ACRES) =    0.04      SUBAREA RUNOFF(CFS) =    0.26
    TOTAL AREA(ACRES) =      0.11        PEAK FLOW RATE(CFS) =
 0.71

    END OF SUBAREA STREET FLOW HYDRAULICS:
    DEPTH(FEET) = 0.20   HALFSTREET FLOOD WIDTH(FEET) =   2.00
    FLOW VELOCITY(FEET/SEC.) =  3.96   DEPTH*VELOCITY(FT*FT/SEC.) =
 0.79
    LONGEST FLOWPATH FROM NODE    118.00 TO NODE    114.00 =   110.00
 FEET.


 ****************************************************************************
    FLOW PROCESS FROM NODE    114.00 TO NODE    114.00 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.) =   2.59
    RAINFALL INTENSITY(INCH/HR) =   7.38
    TOTAL STREAM AREA(ACRES) =     0.11
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.71


 ****************************************************************************
    FLOW PROCESS FROM NODE    116.00 TO NODE    115.00 IS CODE =  21

```



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

 ============================================================================
    RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  82
    INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
    UPSTREAM ELEVATION(FEET) =    621.40
    DOWNSTREAM ELEVATION(FEET) =    621.00
    ELEVATION DIFFERENCE(FEET) =      0.40
    SUBAREA OVERLAND TIME OF FLOW(MIN.) =   10.881
    WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
             THE MAXIMUM OVERLAND FLOW LENGTH =    52.86
             (Reference: Table 3-1B of Hydrology Manual)
             THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc
 CALCULATION!
       50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.468
    SUBAREA RUNOFF(CFS) =      0.13
    TOTAL AREA(ACRES) =      0.07   TOTAL RUNOFF(CFS) =      0.13


 ****************************************************************************
    FLOW PROCESS FROM NODE    115.00 TO NODE    114.00 IS CODE =  51

 ----------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

 ============================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    621.00  DOWNSTREAM(FEET) =
 620.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =    70.00   CHANNEL SLOPE =
 0.0143
    CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.045   MAXIMUM DEPTH(FEET) =   2.00
      50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.081
    RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  82
    TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.19
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.71
    AVERAGE FLOW DEPTH(FEET) =   0.08   TRAVEL TIME(MIN.) =   1.64
    Tc(MIN.) =  12.52
    SUBAREA AREA(ACRES) =     0.07       SUBAREA RUNOFF(CFS) =    0.12
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
    TOTAL AREA(ACRES) =      0.14         PEAK FLOW RATE(CFS) =
 0.23

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   0.76
    LONGEST FLOWPATH FROM NODE    116.00 TO NODE    114.00 =   140.00
 FEET.

```

```
****************************************************************************
    FLOW PROCESS FROM NODE    114.00 TO NODE    114.00 IS CODE =   1
----------------------------------------------------------------------------
    >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
    >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
    TOTAL NUMBER OF STREAMS =  2
    CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
    TIME OF CONCENTRATION(MIN.) =  12.52
    RAINFALL INTENSITY(INCH/HR) =   4.08
    TOTAL STREAM AREA(ACRES) =     0.14
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.23

    ** CONFLUENCE DATA **
    STREAM     RUNOFF      Tc      INTENSITY      AREA
    NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
        1        0.71     2.59        7.377          0.11
        2        0.23    12.52        4.081          0.14

    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        0.75     2.59       7.377
        2        0.62    12.52       4.081

    COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
    PEAK FLOW RATE(CFS) =      0.75   Tc(MIN.) =    2.59
    TOTAL AREA(ACRES) =      0.25
    LONGEST FLOWPATH FROM NODE    116.00 TO NODE    114.00 =   140.00
FEET.

****************************************************************************
    FLOW PROCESS FROM NODE    114.00 TO NODE    106.00 IS CODE =  62
----------------------------------------------------------------------------
    >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
    >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
    UPSTREAM ELEVATION(FEET) =  620.00  DOWNSTREAM ELEVATION(FEET) =
601.00
    STREET LENGTH(FEET) =   260.00   CURB HEIGHT(INCHES) =  8.0
    STREET HALFWIDTH(FEET) = 40.00

    DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
    INSIDE STREET CROSSFALL(DECIMAL) =  0.020
    OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020
```



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

      **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.65
      STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
      STREET FLOW DEPTH(FEET) =  0.23
      HALFSTREET FLOOD WIDTH(FEET) =    3.72
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.04
      PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.17
    STREET FLOW TRAVEL TIME(MIN.) =   0.86   Tc(MIN.) =   3.45
      50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
    NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
    STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  98
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.748
    SUBAREA AREA(ACRES) =    0.28      SUBAREA RUNOFF(CFS) =    1.80
    TOTAL AREA(ACRES) =      0.53        PEAK FLOW RATE(CFS) =
2.93

    END OF SUBAREA STREET FLOW HYDRAULICS:
    DEPTH(FEET) = 0.28   HALFSTREET FLOOD WIDTH(FEET) =   6.04
    FLOW VELOCITY(FEET/SEC.) =  5.28   DEPTH*VELOCITY(FT*FT/SEC.) =
1.47
    LONGEST FLOWPATH FROM NODE    116.00 TO NODE    106.00 =   400.00
FEET.

****************************************************************************
    FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 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.) =   3.45
    RAINFALL INTENSITY(INCH/HR) =   7.38
    TOTAL STREAM AREA(ACRES) =     0.53
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.93

****************************************************************************
    FLOW PROCESS FROM NODE    112.00 TO NODE    110.00 IS CODE =  21
----------------------------------------------------------------------------
    >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
```

```
    RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  82
    INITIAL SUBAREA FLOW-LENGTH(FEET) =    65.00
    UPSTREAM ELEVATION(FEET) =    618.00
    DOWNSTREAM ELEVATION(FEET) =    614.50
    ELEVATION DIFFERENCE(FEET) =      3.50
    SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.713
      50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.769
    SUBAREA RUNOFF(CFS) =      0.14
    TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.14


****************************************************************************
    FLOW PROCESS FROM NODE    110.00 TO NODE    108.00 IS CODE =  51

----------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

============================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    614.50  DOWNSTREAM(FEET) =
611.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   110.00   CHANNEL SLOPE =
0.0318
    CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.045   MAXIMUM DEPTH(FEET) =   2.00
      50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.880
    RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  82
    TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.49
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.32
    AVERAGE FLOW DEPTH(FEET) =   0.11   TRAVEL TIME(MIN.) =   1.39
    Tc(MIN.) =   7.11
    SUBAREA AREA(ACRES) =     0.29       SUBAREA RUNOFF(CFS) =    0.70
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
    TOTAL AREA(ACRES) =      0.34         PEAK FLOW RATE(CFS) =
0.82

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   1.52
    LONGEST FLOWPATH FROM NODE    112.00 TO NODE    108.00 =   175.00
FEET.


****************************************************************************
    FLOW PROCESS FROM NODE    108.00 TO NODE    106.00 IS CODE =  51

----------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

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



```
    ELEVATION DATA: UPSTREAM(FEET) =    611.00  DOWNSTREAM(FEET) =
601.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   170.00   CHANNEL SLOPE =
0.0588
    CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
    MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
      50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.628
    STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  98
    TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      2.30
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.67
    AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   0.50
    Tc(MIN.) =   7.61
    SUBAREA AREA(ACRES) =     0.61       SUBAREA RUNOFF(CFS) =    2.99
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.705
    TOTAL AREA(ACRES) =      0.95         PEAK FLOW RATE(CFS) =
3.77

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   6.86
    LONGEST FLOWPATH FROM NODE    112.00 TO NODE    106.00 =   345.00
FEET.


****************************************************************************
    FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =   1

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

============================================================================
    TOTAL NUMBER OF STREAMS =  2
    CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
    TIME OF CONCENTRATION(MIN.) =   7.61
    RAINFALL INTENSITY(INCH/HR) =   5.63
    TOTAL STREAM AREA(ACRES) =     0.95
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.77

    ** CONFLUENCE DATA **
    STREAM     RUNOFF      Tc      INTENSITY      AREA
    NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
        1        2.93     3.45        7.377         0.53
        1        1.56    13.26        3.933         0.53
        2        3.77     7.61        5.628         0.95

    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        4.64     3.45       7.377
```

```
        2        6.00     7.61       5.628
        3        4.20    13.26       3.933

    COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
    PEAK FLOW RATE(CFS) =      6.00   Tc(MIN.) =    7.61
    TOTAL AREA(ACRES) =      1.48
    LONGEST FLOWPATH FROM NODE    116.00 TO NODE    106.00 =   400.00
FEET.

****************************************************************************
    FLOW PROCESS FROM NODE    106.00 TO NODE    100.00 IS CODE =  62
----------------------------------------------------------------------------
    >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
    >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
    UPSTREAM ELEVATION(FEET) =  601.00  DOWNSTREAM ELEVATION(FEET) =
581.00
    STREET LENGTH(FEET) =   330.00   CURB HEIGHT(INCHES) =  8.0
    STREET HALFWIDTH(FEET) = 40.00

    DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
    INSIDE STREET CROSSFALL(DECIMAL) =  0.020
    OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

      **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.84
      STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
      STREET FLOW DEPTH(FEET) =  0.36
      HALFSTREET FLOOD WIDTH(FEET) =    9.98
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.77
      PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.07
    STREET FLOW TRAVEL TIME(MIN.) =   0.95   Tc(MIN.) =   8.56
      50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.216
    STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  98
    AREA-AVERAGE RUNOFF COEFFICIENT =  1.113
    SUBAREA AREA(ACRES) =    0.37      SUBAREA RUNOFF(CFS) =    1.68
    TOTAL AREA(ACRES) =      1.85        PEAK FLOW RATE(CFS) =
10.74

    END OF SUBAREA STREET FLOW HYDRAULICS:
    DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  12.23
    FLOW VELOCITY(FEET/SEC.) =  6.37   DEPTH*VELOCITY(FT*FT/SEC.) =
2.57
    ** PEAK FLOW RATE TABLE **
```



```
    STREAM   RUNOFF       Tc
    NUMBER    (CFS)     (MIN.)
       1       15.19       4.45
       2       10.74       8.56
       3        7.71      14.29
    NEW PEAK FLOW DATA ARE:
    PEAK FLOW RATE(CFS) =    15.19  Tc(MIN.) =   4.45
    LONGEST FLOWPATH FROM NODE    116.00 TO NODE    100.00 =   730.00
FEET.

****************************************************************************
    FLOW PROCESS FROM NODE    100.00 TO NODE    100.00 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.) =   4.45
    RAINFALL INTENSITY(INCH/HR) =   7.38
    TOTAL STREAM AREA(ACRES) =     1.85
    PEAK FLOW RATE(CFS) AT CONFLUENCE =     15.19

****************************************************************************
    FLOW PROCESS FROM NODE    104.00 TO NODE    102.00 IS CODE =  21
----------------------------------------------------------------------------
    >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
    RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  82
    INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
    UPSTREAM ELEVATION(FEET) =    604.00
    DOWNSTREAM ELEVATION(FEET) =    594.50
    ELEVATION DIFFERENCE(FEET) =      9.50
    SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.865
      50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.656
    SUBAREA RUNOFF(CFS) =      0.35
    TOTAL AREA(ACRES) =      0.13   TOTAL RUNOFF(CFS) =      0.35

****************************************************************************
    FLOW PROCESS FROM NODE    102.00 TO NODE    100.00 IS CODE =  51
----------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
```

```
    ELEVATION DATA: UPSTREAM(FEET) =    594.50  DOWNSTREAM(FEET) =
581.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   360.00   CHANNEL SLOPE =
0.0375
    CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
    MANNING'S FACTOR = 0.045   MAXIMUM DEPTH(FEET) =   2.00
      50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.093
    RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  82
    TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.32
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.99
    AVERAGE FLOW DEPTH(FEET) =   0.20   TRAVEL TIME(MIN.) =   3.02
    Tc(MIN.) =   8.88
    SUBAREA AREA(ACRES) =     0.91       SUBAREA RUNOFF(CFS) =    1.90
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
    TOTAL AREA(ACRES) =      1.04         PEAK FLOW RATE(CFS) =
2.17

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.26   FLOW VELOCITY(FEET/SEC.) =   2.35
    LONGEST FLOWPATH FROM NODE    104.00 TO NODE    100.00 =   460.00
FEET.

****************************************************************************
    FLOW PROCESS FROM NODE    100.00 TO NODE    100.00 IS CODE =   1
----------------------------------------------------------------------------
    >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
    >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
    TOTAL NUMBER OF STREAMS =  2
    CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
    TIME OF CONCENTRATION(MIN.) =   8.88
    RAINFALL INTENSITY(INCH/HR) =   5.09
    TOTAL STREAM AREA(ACRES) =     1.04
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.17

    ** CONFLUENCE DATA **
    STREAM     RUNOFF      Tc      INTENSITY      AREA
    NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
        1       15.19     4.45        7.377          1.85
        1       10.74     8.56        5.216          1.85
        1        7.71    14.29        3.747          1.85
        2        2.17     8.88        5.093          1.04

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

    ** PEAK FLOW RATE TABLE **
    STREAM     RUNOFF      Tc      INTENSITY
    NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
```



```
        1       16.28     4.45       7.377
        2       12.83     8.56       5.216
        3       12.66     8.88       5.093
        4        9.31    14.29       3.747

    COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
    PEAK FLOW RATE(CFS) =     16.28   Tc(MIN.) =    4.45
    TOTAL AREA(ACRES) =      2.89
    LONGEST FLOWPATH FROM NODE    116.00 TO NODE    100.00 =   730.00
FEET.
                                                                          
============================================================================
    END OF STUDY SUMMARY:
    TOTAL AREA(ACRES)     =      2.89  TC(MIN.) =      4.45
    PEAK FLOW RATE(CFS)   =     16.28
    *** PEAK FLOW RATE TABLE ***
            Q(CFS)   Tc(MIN.)
    1       16.28       4.45
    2       12.83       8.56
    3       12.66       8.88
    4        9.31      14.29
                                                                          
============================================================================
                                                                          
============================================================================
    END OF RATIONAL METHOD ANALYSIS
```

```
____________________________________________________________________
**********************************************************************

              RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
              Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                           2003,1985,1981 HYDROLOGY MANUAL
           (c) Copyright 1982-2005 Advanced Engineering Software (aes)
               Ver. 2.0 Release Date: 06/01/2005  License ID 1553

                              Analysis prepared by:

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                               San Diego, CA 92110

                      Tel: 619-641-5900, Fax: 619-641-5910

   ************************** DESCRIPTION OF STUDY
**************************
  * LAGO DE SAN MARCOS
       *
  * 100-YEAR STORM EVENT - EXISTING CONDITION
       *
  * JN 146-32 (08-16-05)
       *
**********************************************************************

    FILE NAME: C:\146EX100.DAT
    TIME/DATE OF STUDY: 10:34 01/12/2006
----------------------------------------------------------------------
    USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------
    2003 SAN DIEGO MANUAL CRITERIA

    USER SPECIFIED STORM EVENT(YEAR) = 100.00
    6-HOUR DURATION PRECIPITATION (INCHES) =   3.000
    SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
    SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE
= 0.90
    SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
    NOTE: CONSIDER ALL CONFLUENCE STREAM COMBINATIONS
          FOR ALL 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   40.0     20.0    0.020/0.020/0.020   0.67    2.00 0.0313
0.167 0.0150
    3   60.0     30.0    0.020/0.020/0.020   0.67    2.00 0.0313
0.167 0.0150

    GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
      1. Relative Flow-Depth =  0.40 FEET
         as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
      2. (Depth)*(Velocity) Constraint =  4.0 (FT*FT/S)
    *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
     OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

**********************************************************************
    FLOW PROCESS FROM NODE    304.00 TO NODE    302.00 IS CODE =  21
----------------------------------------------------------------------
    >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
======================================================================
    RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  82
    INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
    UPSTREAM ELEVATION(FEET) =    622.00
    DOWNSTREAM ELEVATION(FEET) =    621.00
    ELEVATION DIFFERENCE(FEET) =      1.00
    SUBAREA OVERLAND TIME OF FLOW(MIN.) =    9.227
     100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.324
    SUBAREA RUNOFF(CFS) =      0.22
    TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.22

**********************************************************************
    FLOW PROCESS FROM NODE    302.00 TO NODE    300.00 IS CODE =  51
----------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
======================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    621.00  DOWNSTREAM(FEET) =
620.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =    80.00   CHANNEL SLOPE =
0.0125
    CHANNEL BASE(FEET) =    5.00   "Z" FACTOR =   3.000
```

```
    MANNING'S FACTOR = 0.045   MAXIMUM DEPTH(FEET) =   2.00
     100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.710
    RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  82
    TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.32
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.69
    AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   1.93
    Tc(MIN.) =  11.16
    SUBAREA AREA(ACRES) =     0.10       SUBAREA RUNOFF(CFS) =    0.19
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
    TOTAL AREA(ACRES) =      0.20         PEAK FLOW RATE(CFS) =
0.39

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.10   FLOW VELOCITY(FEET/SEC.) =   0.76
    LONGEST FLOWPATH FROM NODE    304.00 TO NODE    300.00 =   150.00
FEET.

****************************************************************
    FLOW PROCESS FROM NODE    300.00 TO NODE    200.00 IS CODE =  62
----------------------------------------------------------------
    >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
    >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
================================================================
    UPSTREAM ELEVATION(FEET) =  620.00  DOWNSTREAM ELEVATION(FEET) =
601.00
    STREET LENGTH(FEET) =   260.00   CURB HEIGHT(INCHES) =  8.0
    STREET HALFWIDTH(FEET) = 60.00

    DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  30.00
    INSIDE STREET CROSSFALL(DECIMAL) =  0.020
    OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

      **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.17
      STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
      STREET FLOW DEPTH(FEET) =  0.20
      HALFSTREET FLOOD WIDTH(FEET) =    2.00
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.87
      PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.16
    STREET FLOW TRAVEL TIME(MIN.) =   0.74   Tc(MIN.) =  11.90
     100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.519
    STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  98
```



```
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.717
    SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    1.57
    TOTAL AREA(ACRES) =      0.60        PEAK FLOW RATE(CFS) =
1.94

    END OF SUBAREA STREET FLOW HYDRAULICS:
    DEPTH(FEET) = 0.25   HALFSTREET FLOOD WIDTH(FEET) =   4.43
    FLOW VELOCITY(FEET/SEC.) =  5.03   DEPTH*VELOCITY(FT*FT/SEC.) =
1.24
    LONGEST FLOWPATH FROM NODE    304.00 TO NODE    200.00 =   410.00
FEET.

****************************************************************
    FLOW PROCESS FROM NODE    200.00 TO NODE    200.00 IS CODE =   1
----------------------------------------------------------------
    >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================
    TOTAL NUMBER OF STREAMS =  2
    CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
    TIME OF CONCENTRATION(MIN.) =  11.90
    RAINFALL INTENSITY(INCH/HR) =   4.52
    TOTAL STREAM AREA(ACRES) =     0.60
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.94

****************************************************************
    FLOW PROCESS FROM NODE    206.00 TO NODE    204.00 IS CODE =  21
----------------------------------------------------------------
    >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
================================================================
    RESIDENTIAL (2.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .4900
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  85
    INITIAL SUBAREA FLOW-LENGTH(FEET) =    65.00
    UPSTREAM ELEVATION(FEET) =    618.00
    DOWNSTREAM ELEVATION(FEET) =    614.50
    ELEVATION DIFFERENCE(FEET) =      3.50
    SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.051
     100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.853
    SUBAREA RUNOFF(CFS) =      0.23
    TOTAL AREA(ACRES) =      0.06   TOTAL RUNOFF(CFS) =      0.23

****************************************************************
    FLOW PROCESS FROM NODE    204.00 TO NODE    202.00 IS CODE =  51
----------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```

```
==========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    614.50  DOWNSTREAM(FEET) =
611.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   110.00   CHANNEL SLOPE =
0.0318
    CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.045   MAXIMUM DEPTH(FEET) =   2.00
     100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.813
    RESIDENTIAL (2.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .4900
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  85
    TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.72
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.47
    AVERAGE FLOW DEPTH(FEET) =   0.14   TRAVEL TIME(MIN.) =   1.24
    Tc(MIN.) =   6.30
    SUBAREA AREA(ACRES) =     0.29       SUBAREA RUNOFF(CFS) =    0.97
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.490
    TOTAL AREA(ACRES) =      0.35         PEAK FLOW RATE(CFS) =
1.17

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.19   FLOW VELOCITY(FEET/SEC.) =   1.75
    LONGEST FLOWPATH FROM NODE    206.00 TO NODE    202.00 =   175.00
FEET.

****************************************************************************
    FLOW PROCESS FROM NODE    202.00 TO NODE    200.00 IS CODE =  51
----------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    611.00  DOWNSTREAM(FEET) =
601.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   170.00   CHANNEL SLOPE =
0.0588
    CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
    MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
     100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.478
    RESIDENTIAL (2.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .4900
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  85
    TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      2.14
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.54
    AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   0.51
    Tc(MIN.) =   6.81
    SUBAREA AREA(ACRES) =     0.61       SUBAREA RUNOFF(CFS) =    1.94
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.490
    TOTAL AREA(ACRES) =      0.96         PEAK FLOW RATE(CFS) =
3.05
```



```
    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.15   FLOW VELOCITY(FEET/SEC.) =   6.25
    LONGEST FLOWPATH FROM NODE    206.00 TO NODE    200.00 =   345.00
FEET.

****************************************************************************
    FLOW PROCESS FROM NODE    200.00 TO NODE    200.00 IS CODE =   1
----------------------------------------------------------------------------
    >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
    >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==========================================================================
    TOTAL NUMBER OF STREAMS =  2
    CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
    TIME OF CONCENTRATION(MIN.) =   6.81
    RAINFALL INTENSITY(INCH/HR) =   6.48
    TOTAL STREAM AREA(ACRES) =     0.96
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.05

    ** CONFLUENCE DATA **
    STREAM     RUNOFF      Tc      INTENSITY      AREA
    NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
        1        1.94    11.90        4.519          0.60
        2        3.05     6.81        6.478          0.96

    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        4.16     6.81       6.478
        2        4.07    11.90       4.519

    COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
    PEAK FLOW RATE(CFS) =      4.16   Tc(MIN.) =    6.81
    TOTAL AREA(ACRES) =      1.56
    LONGEST FLOWPATH FROM NODE    304.00 TO NODE    200.00 =   410.00
FEET.

****************************************************************************
    FLOW PROCESS FROM NODE    200.00 TO NODE    100.00 IS CODE =  62
----------------------------------------------------------------------------
    >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
    >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
==========================================================================
    UPSTREAM ELEVATION(FEET) =  601.00  DOWNSTREAM ELEVATION(FEET) =
581.00
    STREET LENGTH(FEET) =   330.00   CURB HEIGHT(INCHES) =  8.0
```

```
    STREET HALFWIDTH(FEET) = 60.00

    DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  30.00
    INSIDE STREET CROSSFALL(DECIMAL) =  0.020
    OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

      **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.19
      STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
      STREET FLOW DEPTH(FEET) =  0.33
      HALFSTREET FLOOD WIDTH(FEET) =    8.75
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.43
      PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.81
    STREET FLOW TRAVEL TIME(MIN.) =   1.01   Tc(MIN.) =   7.82
     100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.923
    STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  98
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.637
    SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    2.06
    TOTAL AREA(ACRES) =      1.96        PEAK FLOW RATE(CFS) =
7.39

    END OF SUBAREA STREET FLOW HYDRAULICS:
    DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  10.39
    FLOW VELOCITY(FEET/SEC.) =  5.82   DEPTH*VELOCITY(FT*FT/SEC.) =
2.13
    LONGEST FLOWPATH FROM NODE    304.00 TO NODE    100.00 =   740.00
FEET.

****************************************************************************
    FLOW PROCESS FROM NODE    100.00 TO NODE    100.00 IS CODE =   1
----------------------------------------------------------------------------
    >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
    TOTAL NUMBER OF STREAMS =  2
    CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
    TIME OF CONCENTRATION(MIN.) =   7.82
    RAINFALL INTENSITY(INCH/HR) =   5.92
    TOTAL STREAM AREA(ACRES) =     1.96
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.39

****************************************************************************
    FLOW PROCESS FROM NODE    104.00 TO NODE    102.00 IS CODE =  21
```



```
----------------------------------------------------------------------------
    >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
    RESIDENTIAL (2.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .4900
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  85
    INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
    UPSTREAM ELEVATION(FEET) =    604.00
    DOWNSTREAM ELEVATION(FEET) =    594.50
    ELEVATION DIFFERENCE(FEET) =      9.50
    SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.185
     100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.721
    SUBAREA RUNOFF(CFS) =      0.49
    TOTAL AREA(ACRES) =      0.13   TOTAL RUNOFF(CFS) =      0.49


****************************************************************************
    FLOW PROCESS FROM NODE    102.00 TO NODE    100.00 IS CODE =  51
----------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    594.50  DOWNSTREAM(FEET) =
581.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   360.00   CHANNEL SLOPE =
0.0375
    CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   2.000
    MANNING'S FACTOR = 0.045   MAXIMUM DEPTH(FEET) =   2.00
     100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.874
    RESIDENTIAL (2.9 DU/AC OR LESS) RUNOFF COEFFICIENT = .4900
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  85
    TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.82
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.19
    AVERAGE FLOW DEPTH(FEET) =   0.24   TRAVEL TIME(MIN.) =   2.74
    Tc(MIN.) =   7.92
    SUBAREA AREA(ACRES) =     0.91       SUBAREA RUNOFF(CFS) =    2.62
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.490
    TOTAL AREA(ACRES) =      1.04         PEAK FLOW RATE(CFS) =
2.99

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.32   FLOW VELOCITY(FEET/SEC.) =   2.61
    LONGEST FLOWPATH FROM NODE    104.00 TO NODE    100.00 =   460.00
FEET.

****************************************************************************
    FLOW PROCESS FROM NODE    100.00 TO NODE    100.00 IS CODE =   1
----------------------------------------------------------------------------
```

```
    >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
    >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
                                                                        
==================================================================
    TOTAL NUMBER OF STREAMS =  2
    CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
    TIME OF CONCENTRATION(MIN.) =   7.92
    RAINFALL INTENSITY(INCH/HR) =   5.87
    TOTAL STREAM AREA(ACRES) =     1.04
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.99

    ** CONFLUENCE DATA **
    STREAM     RUNOFF      Tc      INTENSITY      AREA
    NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
        1        7.39     7.82        5.923          1.96
        1        5.35    12.92        4.284          1.96
        2        2.99     7.92        5.874          1.04

    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       10.35     7.82       5.923
        2       10.33     7.92       5.874
        3        7.53    12.92       4.284

    COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
    PEAK FLOW RATE(CFS) =     10.35   Tc(MIN.) =    7.82
    TOTAL AREA(ACRES) =      3.00
    LONGEST FLOWPATH FROM NODE    304.00 TO NODE    100.00 =   740.00
FEET.
                                                                        
==================================================================
    END OF STUDY SUMMARY:
    TOTAL AREA(ACRES)     =      3.00  TC(MIN.) =      7.82
    PEAK FLOW RATE(CFS)   =     10.35
    *** PEAK FLOW RATE TABLE ***
           Q(CFS)   Tc(MIN.)
    1       10.35       7.82
    2       10.33       7.92
    3        7.53      12.92
                                                                        
==================================================================
                                                                        
==================================================================
    END OF RATIONAL METHOD ANALYSIS
```

```
____________________________________________________________________
**********************************************************************

              RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
              Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                           2003,1985,1981 HYDROLOGY MANUAL
           (c) Copyright 1982-2003 Advanced Engineering Software (aes)
               Ver. 1.5A Release Date: 01/01/2003  License ID 1553

                                Analysis prepared by:


   ************************** DESCRIPTION OF STUDY
**************************
  * LAGO DE SAN MARCOS
       *
  * 10-YEAR STORM EVENT - PROPOSED CONDITION
       *
  * JN 146-33
       *
**********************************************************************

    FILE NAME: C:\146PR010.DAT
    TIME/DATE OF STUDY: 09:56 07/22/2004
----------------------------------------------------------------------
    USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------
    2003 SAN DIEGO MANUAL CRITERIA

    USER SPECIFIED STORM EVENT(YEAR) =  10.00
    6-HOUR DURATION PRECIPITATION (INCHES) =   2.000
    SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
    SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE
= 0.90
    SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
    NOTE: CONSIDER ALL CONFLUENCE STREAM COMBINATIONS
          FOR ALL 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   40.0     20.0    0.020/0.020/0.020   0.67    2.00 0.0313
0.167 0.0150
    3   60.0     30.0    0.020/0.020/0.020   0.67    2.00 0.0313
0.167 0.0150

    GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
      1. Relative Flow-Depth =  0.40 FEET
         as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
      2. (Depth)*(Velocity) Constraint =  4.0 (FT*FT/S)
    *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
     OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*


**********************************************************************
    FLOW PROCESS FROM NODE    118.00 TO NODE    117.00 IS CODE =  21
----------------------------------------------------------------------
    >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
======================================================================
    STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  98
    INITIAL SUBAREA FLOW-LENGTH(FEET) =    80.00
    UPSTREAM ELEVATION(FEET) =    623.70
    DOWNSTREAM ELEVATION(FEET) =    621.00
    ELEVATION DIFFERENCE(FEET) =      2.70
    SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.469
      10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.269
    NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
    SUBAREA RUNOFF(CFS) =      0.32
    TOTAL AREA(ACRES) =      0.07   TOTAL RUNOFF(CFS) =      0.32


**********************************************************************
    FLOW PROCESS FROM NODE    117.00 TO NODE    114.00 IS CODE =  62
----------------------------------------------------------------------
    >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
    >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
======================================================================
    UPSTREAM ELEVATION(FEET) =  621.00  DOWNSTREAM ELEVATION(FEET) =
620.00
    STREET LENGTH(FEET) =    30.00   CURB HEIGHT(INCHES) =  8.0
    STREET HALFWIDTH(FEET) = 40.00
```

```
    DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
    INSIDE STREET CROSSFALL(DECIMAL) =  0.020
    OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

      **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.41
      STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
      STREET FLOW DEPTH(FEET) =  0.20
      HALFSTREET FLOOD WIDTH(FEET) =    2.00
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.96
      PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.79
    STREET FLOW TRAVEL TIME(MIN.) =   0.13   Tc(MIN.) =   2.59
      10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.269
    NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
    STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  98
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
    SUBAREA AREA(ACRES) =    0.04      SUBAREA RUNOFF(CFS) =    0.18
    TOTAL AREA(ACRES) =      0.11        PEAK FLOW RATE(CFS) =
 0.50

    END OF SUBAREA STREET FLOW HYDRAULICS:
    DEPTH(FEET) = 0.20   HALFSTREET FLOOD WIDTH(FEET) =   2.00
    FLOW VELOCITY(FEET/SEC.) =  3.96   DEPTH*VELOCITY(FT*FT/SEC.) =
 0.79
    LONGEST FLOWPATH FROM NODE    118.00 TO NODE    114.00 =   110.00
 FEET.


 ****************************************************************************
    FLOW PROCESS FROM NODE    114.00 TO NODE    114.00 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.) =   2.59
    RAINFALL INTENSITY(INCH/HR) =   5.27
    TOTAL STREAM AREA(ACRES) =     0.11
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.50


 ****************************************************************************
    FLOW PROCESS FROM NODE    116.00 TO NODE    115.00 IS CODE =  21

```



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

 ============================================================================
    RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  82
    INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
    UPSTREAM ELEVATION(FEET) =    621.40
    DOWNSTREAM ELEVATION(FEET) =    621.00
    ELEVATION DIFFERENCE(FEET) =      0.40
    SUBAREA OVERLAND TIME OF FLOW(MIN.) =   10.881
    WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
             THE MAXIMUM OVERLAND FLOW LENGTH =    52.86
             (Reference: Table 3-1B of Hydrology Manual)
             THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc
 CALCULATION!
       10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.191
    SUBAREA RUNOFF(CFS) =      0.13
    TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.13


 ****************************************************************************
    FLOW PROCESS FROM NODE    115.00 TO NODE    114.00 IS CODE =  51

 ----------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

 ============================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    621.00  DOWNSTREAM(FEET) =
 620.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =    70.00   CHANNEL SLOPE =
 0.0143
    CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.045   MAXIMUM DEPTH(FEET) =   2.00
      10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.901
    RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  82
    TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.17
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.67
    AVERAGE FLOW DEPTH(FEET) =   0.08   TRAVEL TIME(MIN.) =   1.73
    Tc(MIN.) =  12.61
    SUBAREA AREA(ACRES) =     0.07       SUBAREA RUNOFF(CFS) =    0.08
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
    TOTAL AREA(ACRES) =      0.17         PEAK FLOW RATE(CFS) =
 0.20

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   0.71
    LONGEST FLOWPATH FROM NODE    116.00 TO NODE    114.00 =   140.00
 FEET.

```

```
****************************************************************************
    FLOW PROCESS FROM NODE    114.00 TO NODE    114.00 IS CODE =   1
----------------------------------------------------------------------------
    >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
    >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
    TOTAL NUMBER OF STREAMS =  2
    CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
    TIME OF CONCENTRATION(MIN.) =  12.61
    RAINFALL INTENSITY(INCH/HR) =   2.90
    TOTAL STREAM AREA(ACRES) =     0.17
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.20

    ** CONFLUENCE DATA **
    STREAM     RUNOFF      Tc      INTENSITY      AREA
    NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
        1        0.50     2.59        5.269          0.11
        2        0.20    12.61        2.901          0.17

    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        0.55     2.59       5.269
        2        0.48    12.61       2.901

    COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
    PEAK FLOW RATE(CFS) =      0.55   Tc(MIN.) =    2.59
    TOTAL AREA(ACRES) =      0.28
    LONGEST FLOWPATH FROM NODE    116.00 TO NODE    114.00 =   140.00
FEET.


****************************************************************************
    FLOW PROCESS FROM NODE    114.00 TO NODE    106.00 IS CODE =  62
----------------------------------------------------------------------------
    >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
    >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
    UPSTREAM ELEVATION(FEET) =  620.00  DOWNSTREAM ELEVATION(FEET) =
601.00
    STREET LENGTH(FEET) =   260.00   CURB HEIGHT(INCHES) =  8.0
    STREET HALFWIDTH(FEET) = 40.00

    DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
    INSIDE STREET CROSSFALL(DECIMAL) =  0.020
    OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020
```



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

      **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.19
      STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
      STREET FLOW DEPTH(FEET) =  0.20
      HALFSTREET FLOOD WIDTH(FEET) =    2.00
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.87
      PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.16
    STREET FLOW TRAVEL TIME(MIN.) =   0.74   Tc(MIN.) =   3.33
      10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.269
    NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
    STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  98
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.730
    SUBAREA AREA(ACRES) =    0.28      SUBAREA RUNOFF(CFS) =    1.28
    TOTAL AREA(ACRES) =      0.56        PEAK FLOW RATE(CFS) =
2.16

    END OF SUBAREA STREET FLOW HYDRAULICS:
    DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   4.85
    FLOW VELOCITY(FEET/SEC.) =  5.08   DEPTH*VELOCITY(FT*FT/SEC.) =
1.30
    LONGEST FLOWPATH FROM NODE    116.00 TO NODE    106.00 =   400.00
FEET.


****************************************************************************
    FLOW PROCESS FROM NODE    106.00 TO NODE    100.00 IS CODE =  62
----------------------------------------------------------------------------
    >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
    >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
    UPSTREAM ELEVATION(FEET) =  601.00  DOWNSTREAM ELEVATION(FEET) =
581.00
    STREET LENGTH(FEET) =   330.00   CURB HEIGHT(INCHES) =  8.0
    STREET HALFWIDTH(FEET) = 40.00

    DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
    INSIDE STREET CROSSFALL(DECIMAL) =  0.020
    OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

```
      **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.00
      STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
      STREET FLOW DEPTH(FEET) =  0.29
      HALFSTREET FLOOD WIDTH(FEET) =    6.54
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.87
      PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.41
    STREET FLOW TRAVEL TIME(MIN.) =   1.13   Tc(MIN.) =   4.46
      10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.269
    NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
    STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  98
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.786
    SUBAREA AREA(ACRES) =    0.37      SUBAREA RUNOFF(CFS) =    1.70
    TOTAL AREA(ACRES) =      0.93        PEAK FLOW RATE(CFS) =
3.85

    END OF SUBAREA STREET FLOW HYDRAULICS:
    DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   7.52
    FLOW VELOCITY(FEET/SEC.) =  5.10   DEPTH*VELOCITY(FT*FT/SEC.) =
1.57
    LONGEST FLOWPATH FROM NODE    116.00 TO NODE    100.00 =   730.00
FEET.

****************************************************************************
    FLOW PROCESS FROM NODE    100.00 TO NODE    100.00 IS CODE =  10
----------------------------------------------------------------------------
    >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
    FLOW PROCESS FROM NODE    100.00 TO NODE    100.00 IS CODE =  13
----------------------------------------------------------------------------
    >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
    FLOW PROCESS FROM NODE    113.00 TO NODE    112.00 IS CODE =  21
----------------------------------------------------------------------------
    >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
    RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  92
```



```
    INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
    UPSTREAM ELEVATION(FEET) =    608.50
    DOWNSTREAM ELEVATION(FEET) =    607.50
    ELEVATION DIFFERENCE(FEET) =      1.00
    SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.188
    WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
             THE MAXIMUM OVERLAND FLOW LENGTH =    69.29
             (Reference: Table 3-1B of Hydrology Manual)
             THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc
CALCULATION!
      10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.145
    SUBAREA RUNOFF(CFS) =      0.37
    TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.37


****************************************************************************
    FLOW PROCESS FROM NODE    112.00 TO NODE    111.00 IS CODE =  62
----------------------------------------------------------------------------
    >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
    >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
    UPSTREAM ELEVATION(FEET) =  607.50  DOWNSTREAM ELEVATION(FEET) =
606.00
    STREET LENGTH(FEET) =   120.00   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) =       1.34
      STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
      STREET FLOW DEPTH(FEET) =  0.23
      HALFSTREET FLOOD WIDTH(FEET) =    3.91
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.04
      PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.47
    STREET FLOW TRAVEL TIME(MIN.) =   0.98   Tc(MIN.) =   6.17
      10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.601
    RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  92
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
    SUBAREA AREA(ACRES) =    0.60      SUBAREA RUNOFF(CFS) =    1.96
    TOTAL AREA(ACRES) =      0.70        PEAK FLOW RATE(CFS) =
2.29
```

```
    END OF SUBAREA STREET FLOW HYDRAULICS:
    DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   6.28
    FLOW VELOCITY(FEET/SEC.) =  2.09   DEPTH*VELOCITY(FT*FT/SEC.) =
0.58
    LONGEST FLOWPATH FROM NODE    113.00 TO NODE    111.00 =   190.00
FEET.


****************************************************************************
    FLOW PROCESS FROM NODE    111.00 TO NODE    109.00 IS CODE =  31

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

============================================================================
    ELEVATION DATA: UPSTREAM(FEET) =   602.50  DOWNSTREAM(FEET) =
597.50
    FLOW LENGTH(FEET) =    95.00   MANNING'S N =  0.013
    ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
    DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.8 INCHES
    PIPE-FLOW VELOCITY(FEET/SEC.) =   8.28
    ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
    PIPE-FLOW(CFS) =      2.29
    PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   6.36
    LONGEST FLOWPATH FROM NODE    113.00 TO NODE    109.00 =   285.00
FEET.


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

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

============================================================================
    TOTAL NUMBER OF STREAMS =  2
    CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
    TIME OF CONCENTRATION(MIN.) =   6.36
    RAINFALL INTENSITY(INCH/HR) =   4.51
    TOTAL STREAM AREA(ACRES) =     0.70
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.29


****************************************************************************
    FLOW PROCESS FROM NODE    110.00 TO NODE    109.50 IS CODE =  21

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

============================================================================
    RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  82
```



```
    INITIAL SUBAREA FLOW-LENGTH(FEET) =    95.00
    UPSTREAM ELEVATION(FEET) =    610.00
    DOWNSTREAM ELEVATION(FEET) =    602.00
    ELEVATION DIFFERENCE(FEET) =      8.00
    SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.951
      10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.710
    SUBAREA RUNOFF(CFS) =      0.15
    TOTAL AREA(ACRES) =      0.08   TOTAL RUNOFF(CFS) =      0.15


****************************************************************************
    FLOW PROCESS FROM NODE    109.50 TO NODE    109.00 IS CODE =  51

----------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

============================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    602.00  DOWNSTREAM(FEET) =
601.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =    90.00   CHANNEL SLOPE =
0.0111
    CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.013   MAXIMUM DEPTH(FEET) =   2.00
      10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.365
    RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  92
    TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.46
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.01
    AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   0.75
    Tc(MIN.) =   6.70
    SUBAREA AREA(ACRES) =     0.20       SUBAREA RUNOFF(CFS) =    0.62
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.624
    TOTAL AREA(ACRES) =      0.28         PEAK FLOW RATE(CFS) =
0.76

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.10   FLOW VELOCITY(FEET/SEC.) =   2.41
    LONGEST FLOWPATH FROM NODE    110.00 TO NODE    109.00 =   185.00
FEET.


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

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

============================================================================
    TOTAL NUMBER OF STREAMS =  2
    CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
    TIME OF CONCENTRATION(MIN.) =   6.70
```

```
RAINFALL INTENSITY(INCH/HR) =   4.36
TOTAL STREAM AREA(ACRES) =     0.28
PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.76

** CONFLUENCE DATA **
STREAM     RUNOFF      Tc      INTENSITY      AREA
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1        2.29     6.36        4.511          0.70
    2        0.76     6.70        4.365          0.28

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        3.01     6.36       4.511
    2        2.98     6.70       4.365

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =      3.01   Tc(MIN.) =    6.36
TOTAL AREA(ACRES) =      0.98
LONGEST FLOWPATH FROM NODE    113.00 TO NODE    109.00 =   285.00
FEET.


****************************************************************************
FLOW PROCESS FROM NODE    109.00 TO NODE    107.00 IS CODE =  31

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

============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   597.50  DOWNSTREAM(FEET) =
592.50
FLOW LENGTH(FEET) =   180.00   MANNING'S N =  0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   7.14
ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      3.01
PIPE TRAVEL TIME(MIN.) =   0.42    Tc(MIN.) =   6.78
LONGEST FLOWPATH FROM NODE    113.00 TO NODE    107.00 =   465.00
FEET.


****************************************************************************
FLOW PROCESS FROM NODE    107.00 TO NODE    107.00 IS CODE =   1

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

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



```
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MIN.) =   6.78
RAINFALL INTENSITY(INCH/HR) =   4.33
TOTAL STREAM AREA(ACRES) =     0.98
PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.01


****************************************************************************
FLOW PROCESS FROM NODE    108.00 TO NODE    107.50 IS CODE =  21

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

============================================================================
RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) =  92
INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
UPSTREAM ELEVATION(FEET) =    598.00
DOWNSTREAM ELEVATION(FEET) =    597.50
ELEVATION DIFFERENCE(FEET) =      0.50
SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.964
  10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.269
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) =      0.37
TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.37


****************************************************************************
FLOW PROCESS FROM NODE    107.50 TO NODE    107.00 IS CODE =  62

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

============================================================================
UPSTREAM ELEVATION(FEET) =  597.50  DOWNSTREAM ELEVATION(FEET) =
596.00
STREET LENGTH(FEET) =   110.00   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) =       1.06
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
```

```
      STREET FLOW DEPTH(FEET) =  0.20
      HALFSTREET FLOOD WIDTH(FEET) =    2.00
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.54
      PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.50
    STREET FLOW TRAVEL TIME(MIN.) =   0.72   Tc(MIN.) =   5.69
      10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.850
    RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  92
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
    SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    1.38
    TOTAL AREA(ACRES) =      0.50        PEAK FLOW RATE(CFS) =
1.72

    END OF SUBAREA STREET FLOW HYDRAULICS:
    DEPTH(FEET) = 0.25   HALFSTREET FLOOD WIDTH(FEET) =   4.84
    FLOW VELOCITY(FEET/SEC.) =  2.13   DEPTH*VELOCITY(FT*FT/SEC.) =
0.53
    LONGEST FLOWPATH FROM NODE    108.00 TO NODE    107.00 =   160.00
FEET.


****************************************************************************
    FLOW PROCESS FROM NODE    107.00 TO NODE    107.00 IS CODE =   1
                                                                            .
----------------------------------------------------------------------------
    >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
    >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
                                                                            .
============================================================================
    TOTAL NUMBER OF STREAMS =  2
    CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
    TIME OF CONCENTRATION(MIN.) =   5.69
    RAINFALL INTENSITY(INCH/HR) =   4.85
    TOTAL STREAM AREA(ACRES) =     0.50
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.72

    ** CONFLUENCE DATA **
    STREAM     RUNOFF      Tc      INTENSITY      AREA
    NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
        1        3.01     6.78        4.329          0.98
        1        2.98     7.12        4.196          0.98
        2        1.72     5.69        4.850          0.50

    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        4.41     5.69       4.850
        2        4.55     6.78       4.329
        3        4.47     7.12       4.196
```



```
    COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
    PEAK FLOW RATE(CFS) =      4.55   Tc(MIN.) =    6.78
    TOTAL AREA(ACRES) =      1.48
    LONGEST FLOWPATH FROM NODE    113.00 TO NODE    107.00 =   465.00
FEET.


****************************************************************************
    FLOW PROCESS FROM NODE    107.00 TO NODE    104.00 IS CODE =  31
                                                                            .
----------------------------------------------------------------------------
    >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
    >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
                                                                            .
============================================================================
    ELEVATION DATA: UPSTREAM(FEET) =   592.50  DOWNSTREAM(FEET) =
585.50
    FLOW LENGTH(FEET) =   130.00   MANNING'S N =  0.013
    ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
    DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.4 INCHES
    PIPE-FLOW VELOCITY(FEET/SEC.) =  10.17
    ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
    PIPE-FLOW(CFS) =      4.55
    PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   6.99
    LONGEST FLOWPATH FROM NODE    113.00 TO NODE    104.00 =   595.00
FEET.


****************************************************************************
    FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =   1
                                                                            .
----------------------------------------------------------------------------
    >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
                                                                            .
============================================================================
    TOTAL NUMBER OF STREAMS =  2
    CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
    TIME OF CONCENTRATION(MIN.) =   6.99
    RAINFALL INTENSITY(INCH/HR) =   4.24
    TOTAL STREAM AREA(ACRES) =     1.48
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.55


                                                                            .
****************************************************************************
    FLOW PROCESS FROM NODE    105.00 TO NODE    104.50 IS CODE =  21
                                                                            .
----------------------------------------------------------------------------
    >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
                                                                            .
============================================================================
    RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  92
    INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
```

```
    UPSTREAM ELEVATION(FEET) =    591.00
    DOWNSTREAM ELEVATION(FEET) =    589.50
    ELEVATION DIFFERENCE(FEET) =      1.50
    SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.442
      10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.269
    NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
    SUBAREA RUNOFF(CFS) =      0.37
    TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.37


****************************************************************************
    FLOW PROCESS FROM NODE    104.50 TO NODE    104.00 IS CODE =  62
----------------------------------------------------------------------------
    >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
    >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
    UPSTREAM ELEVATION(FEET) =  589.50  DOWNSTREAM ELEVATION(FEET) =
589.00
    STREET LENGTH(FEET) =    70.00   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) =       0.94
      STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
      STREET FLOW DEPTH(FEET) =  0.22
      HALFSTREET FLOOD WIDTH(FEET) =    3.41
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.57
      PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.35
    STREET FLOW TRAVEL TIME(MIN.) =   0.74   Tc(MIN.) =   4.18
      10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.269
    NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
    RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  92
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
    SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    1.12
    TOTAL AREA(ACRES) =      0.40        PEAK FLOW RATE(CFS) =
1.50

    END OF SUBAREA STREET FLOW HYDRAULICS:
    DEPTH(FEET) = 0.26   HALFSTREET FLOOD WIDTH(FEET) =   5.66
    FLOW VELOCITY(FEET/SEC.) =  1.56   DEPTH*VELOCITY(FT*FT/SEC.) =
0.41
```



```
    LONGEST FLOWPATH FROM NODE    105.00 TO NODE    104.00 =   120.00
FEET.


****************************************************************************
    FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =   1
----------------------------------------------------------------------------
    >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
    >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
    TOTAL NUMBER OF STREAMS =  2
    CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
    TIME OF CONCENTRATION(MIN.) =   4.18
    RAINFALL INTENSITY(INCH/HR) =   5.27
    TOTAL STREAM AREA(ACRES) =     0.40
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.50

    ** CONFLUENCE DATA **
    STREAM     RUNOFF      Tc      INTENSITY      AREA
    NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
        1        4.41     5.90        4.735         1.48
        1        4.55     6.99        4.243         1.48
        1        4.47     7.33        4.117         1.48
        2        1.50     4.18        5.269         0.40

    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        5.46     4.18       5.269
        2        5.75     5.90       4.735
        3        5.75     6.99       4.243
        4        5.63     7.33       4.117

    COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
    PEAK FLOW RATE(CFS) =      5.75   Tc(MIN.) =    5.90
    TOTAL AREA(ACRES) =      1.88
    LONGEST FLOWPATH FROM NODE    113.00 TO NODE    104.00 =   595.00
FEET.


****************************************************************************
    FLOW PROCESS FROM NODE    104.00 TO NODE    103.00 IS CODE =  31
----------------------------------------------------------------------------
    >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
    >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
    ELEVATION DATA: UPSTREAM(FEET) =   585.50  DOWNSTREAM(FEET) =
```

```
585.00
    FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
    ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
    DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.0 INCHES
    PIPE-FLOW VELOCITY(FEET/SEC.) =   7.57
    ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
    PIPE-FLOW(CFS) =      5.75
    PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   5.96
    LONGEST FLOWPATH FROM NODE    113.00 TO NODE    103.00 =   620.00
FEET.


****************************************************************************
    FLOW PROCESS FROM NODE    103.00 TO NODE    100.00 IS CODE =  31

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

============================================================================
    ELEVATION DATA: UPSTREAM(FEET) =   585.00  DOWNSTREAM(FEET) =
577.00
    FLOW LENGTH(FEET) =   135.00   MANNING'S N =  0.013
    ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
    DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.0 INCHES
    PIPE-FLOW VELOCITY(FEET/SEC.) =  11.24
    ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
    PIPE-FLOW(CFS) =      5.75
    PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   6.16
    LONGEST FLOWPATH FROM NODE    113.00 TO NODE    100.00 =   755.00
FEET.


****************************************************************************
    FLOW PROCESS FROM NODE    100.00 TO NODE    100.00 IS CODE =   1

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

============================================================================
    TOTAL NUMBER OF STREAMS =  2
    CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
    TIME OF CONCENTRATION(MIN.) =   6.16
    RAINFALL INTENSITY(INCH/HR) =   4.61
    TOTAL STREAM AREA(ACRES) =     1.88
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.75


****************************************************************************
    FLOW PROCESS FROM NODE    102.00 TO NODE    101.00 IS CODE =  21

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



```
============================================================================
    RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  82
    INITIAL SUBAREA FLOW-LENGTH(FEET) =   180.00
    UPSTREAM ELEVATION(FEET) =    604.00
    DOWNSTREAM ELEVATION(FEET) =    594.00
    ELEVATION DIFFERENCE(FEET) =     10.00
    SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.013
    WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
             THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
             (Reference: Table 3-1B of Hydrology Manual)
             THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc
CALCULATION!
      10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.236
    SUBAREA RUNOFF(CFS) =      0.14
    TOTAL AREA(ACRES) =      0.08   TOTAL RUNOFF(CFS) =      0.14


****************************************************************************
    FLOW PROCESS FROM NODE    101.00 TO NODE    100.00 IS CODE =  51

----------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

============================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    594.00  DOWNSTREAM(FEET) =
581.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   340.00   CHANNEL SLOPE =
0.0382
    CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.045   MAXIMUM DEPTH(FEET) =   2.00
      10 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.979
    RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  82
    TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.26
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.11
    AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   5.09
    Tc(MIN.) =  12.10
    SUBAREA AREA(ACRES) =     0.20       SUBAREA RUNOFF(CFS) =    0.24
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
    TOTAL AREA(ACRES) =      0.28         PEAK FLOW RATE(CFS) =
0.34

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   1.21
    LONGEST FLOWPATH FROM NODE    102.00 TO NODE    100.00 =   520.00
FEET.


****************************************************************************
    FLOW PROCESS FROM NODE    100.00 TO NODE    100.00 IS CODE =   1
```

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

======================================================================
    TOTAL NUMBER OF STREAMS =  2
    CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
    TIME OF CONCENTRATION(MIN.) =  12.10
    RAINFALL INTENSITY(INCH/HR) =   2.98
    TOTAL STREAM AREA(ACRES) =     0.28
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.34

    ** CONFLUENCE DATA **
    STREAM     RUNOFF      Tc      INTENSITY      AREA
    NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
        1        5.46     4.44        5.269         1.88
        1        5.75     6.16        4.607         1.88
        1        5.75     7.25        4.146         1.88
        1        5.63     7.59        4.026         1.88
        2        0.34    12.10        2.979         0.28

    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        5.58     4.44       5.269
        2        5.93     6.16       4.607
        3        5.96     7.25       4.146
        4        5.85     7.59       4.026
        5        4.51    12.10       2.979

    COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
    PEAK FLOW RATE(CFS) =      5.96   Tc(MIN.) =    7.25
    TOTAL AREA(ACRES) =      2.16
    LONGEST FLOWPATH FROM NODE    113.00 TO NODE    100.00 =   755.00
FEET.


****************************************************************************
    FLOW PROCESS FROM NODE    100.00 TO NODE    100.00 IS CODE =  11

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

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

    ** MAIN STREAM CONFLUENCE DATA **
    STREAM     RUNOFF     Tc      INTENSITY     AREA
    NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
        1        5.58     4.44       5.269        2.16
        2        5.93     6.16       4.607        2.16
```



```
        3        5.96     7.25       4.146        2.16
        4        5.85     7.59       4.026        2.16
        5        4.51    12.10       2.979        2.16
    LONGEST FLOWPATH FROM NODE    113.00 TO NODE    100.00 =   755.00
FEET.

    ** MEMORY BANK #  1 CONFLUENCE DATA **
    STREAM     RUNOFF      Tc      INTENSITY     AREA
    NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
        1        3.85     4.46       5.269        0.93
        2        1.93    14.56       2.645        0.93
    LONGEST FLOWPATH FROM NODE    116.00 TO NODE    100.00 =   730.00
FEET.

    ** PEAK FLOW RATE TABLE **
    STREAM     RUNOFF      Tc      INTENSITY
    NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
        1        9.42     4.44       5.269
        2        9.44     4.46       5.269
        3        9.30     6.16       4.607
        4        8.99     7.25       4.146
        5        8.79     7.59       4.026
        6        6.69    12.10       2.979
        7        5.94    14.56       2.645

    COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
    PEAK FLOW RATE(CFS) =      9.44   Tc(MIN.) =    4.46
    TOTAL AREA(ACRES) =      3.09


****************************************************************************
    FLOW PROCESS FROM NODE    100.00 TO NODE    100.00 IS CODE =  12

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

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

======================================================================
    END OF STUDY SUMMARY:
    TOTAL AREA(ACRES)     =      3.09  TC(MIN.) =      4.46
    PEAK FLOW RATE(CFS)   =      9.44
    *** PEAK FLOW RATE TABLE ***
           Q(CFS)   Tc(MIN.)
    1        9.42      4.44
    2        9.44      4.46
    3        9.30      6.16
    4        9.99      7.25
    5        8.79      7.59
    6        6.69     12.10
    7        5.94     14.56

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

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

```
____________________________________________________________________
**********************************************************************

              RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
              Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                           2003,1985,1981 HYDROLOGY MANUAL
           (c) Copyright 1982-2003 Advanced Engineering Software (aes)
               Ver. 1.5A Release Date: 01/01/2003  License ID 1553

                                Analysis prepared by:


   ************************** DESCRIPTION OF STUDY
**************************
   * LAGO DE SAN MARCOS
         *
   * 50-YEAR STORM EVENT - PROPOSED CONDITION
         *
   * JN 146-33
         *
**********************************************************************

     FILE NAME: C:\146PR050.DAT
     TIME/DATE OF STUDY: 09:59 07/22/2004
----------------------------------------------------------------------
     USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------
     2003 SAN DIEGO MANUAL CRITERIA

     USER SPECIFIED STORM EVENT(YEAR) =  50.00
     6-HOUR DURATION PRECIPITATION (INCHES) =   2.800
     SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
     SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE
= 0.90
     SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
     NOTE: CONSIDER ALL CONFLUENCE STREAM COMBINATIONS
           FOR ALL 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   40.0     20.0    0.020/0.020/0.020   0.67    2.00 0.0313
0.167 0.0150
    3   60.0     30.0    0.020/0.020/0.020   0.67    2.00 0.0313
0.167 0.0150

    GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
      1. Relative Flow-Depth =  0.40 FEET
         as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
      2. (Depth)*(Velocity) Constraint =  4.0 (FT*FT/S)
    *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
     OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*


**********************************************************************
    FLOW PROCESS FROM NODE    118.00 TO NODE    117.00 IS CODE =  21
----------------------------------------------------------------------
    >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
======================================================================
    STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  98
    INITIAL SUBAREA FLOW-LENGTH(FEET) =    80.00
    UPSTREAM ELEVATION(FEET) =    623.70
    DOWNSTREAM ELEVATION(FEET) =    621.00
    ELEVATION DIFFERENCE(FEET) =      2.70
    SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.469
      50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
    NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
    SUBAREA RUNOFF(CFS) =      0.45
    TOTAL AREA(ACRES) =      0.07   TOTAL RUNOFF(CFS) =      0.45


**********************************************************************
    FLOW PROCESS FROM NODE    117.00 TO NODE    114.00 IS CODE =  62
----------------------------------------------------------------------
    >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
    >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
======================================================================
    UPSTREAM ELEVATION(FEET) =  621.00  DOWNSTREAM ELEVATION(FEET) =
620.00
    STREET LENGTH(FEET) =    30.00   CURB HEIGHT(INCHES) =  8.0
    STREET HALFWIDTH(FEET) = 40.00
```

```
    DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
    INSIDE STREET CROSSFALL(DECIMAL) =  0.020
    OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

      **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.58
      STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
      STREET FLOW DEPTH(FEET) =  0.20
      HALFSTREET FLOOD WIDTH(FEET) =    2.00
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.96
      PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.79
    STREET FLOW TRAVEL TIME(MIN.) =   0.13   Tc(MIN.) =   2.59
      50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
    NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
    STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  98
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
    SUBAREA AREA(ACRES) =    0.04      SUBAREA RUNOFF(CFS) =    0.26
    TOTAL AREA(ACRES) =      0.11        PEAK FLOW RATE(CFS) =
 0.71

    END OF SUBAREA STREET FLOW HYDRAULICS:
    DEPTH(FEET) = 0.20   HALFSTREET FLOOD WIDTH(FEET) =   2.00
    FLOW VELOCITY(FEET/SEC.) =  3.96   DEPTH*VELOCITY(FT*FT/SEC.) =
 0.79
    LONGEST FLOWPATH FROM NODE    118.00 TO NODE    114.00 =   110.00
 FEET.


 ****************************************************************************
    FLOW PROCESS FROM NODE    114.00 TO NODE    114.00 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.) =   2.59
    RAINFALL INTENSITY(INCH/HR) =   7.38
    TOTAL STREAM AREA(ACRES) =     0.11
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.71


 ****************************************************************************
    FLOW PROCESS FROM NODE    116.00 TO NODE    115.00 IS CODE =  21

```



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

 ============================================================================
    RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  82
    INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
    UPSTREAM ELEVATION(FEET) =    621.40
    DOWNSTREAM ELEVATION(FEET) =    621.00
    ELEVATION DIFFERENCE(FEET) =      0.40
    SUBAREA OVERLAND TIME OF FLOW(MIN.) =   10.881
    WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
             THE MAXIMUM OVERLAND FLOW LENGTH =    52.86
             (Reference: Table 3-1B of Hydrology Manual)
             THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc
 CALCULATION!
       50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.468
    SUBAREA RUNOFF(CFS) =      0.13
    TOTAL AREA(ACRES) =      0.07   TOTAL RUNOFF(CFS) =      0.13


 ****************************************************************************
    FLOW PROCESS FROM NODE    115.00 TO NODE    114.00 IS CODE =  51

 ----------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

 ============================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    621.00  DOWNSTREAM(FEET) =
 620.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =    70.00   CHANNEL SLOPE =
 0.0143
    CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.045   MAXIMUM DEPTH(FEET) =   2.00
      50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.081
    RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  82
    TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.19
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.71
    AVERAGE FLOW DEPTH(FEET) =   0.08   TRAVEL TIME(MIN.) =   1.64
    Tc(MIN.) =  12.52
    SUBAREA AREA(ACRES) =     0.07       SUBAREA RUNOFF(CFS) =    0.12
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
    TOTAL AREA(ACRES) =      0.14         PEAK FLOW RATE(CFS) =
 0.23

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   0.76
    LONGEST FLOWPATH FROM NODE    116.00 TO NODE    114.00 =   140.00
 FEET.

```

```
****************************************************************************
    FLOW PROCESS FROM NODE    114.00 TO NODE    114.00 IS CODE =   1
----------------------------------------------------------------------------
    >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
    >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
    TOTAL NUMBER OF STREAMS =  2
    CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
    TIME OF CONCENTRATION(MIN.) =  12.52
    RAINFALL INTENSITY(INCH/HR) =   4.08
    TOTAL STREAM AREA(ACRES) =     0.14
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.23

    ** CONFLUENCE DATA **
    STREAM     RUNOFF      Tc      INTENSITY      AREA
    NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
        1        0.71     2.59        7.377          0.11
        2        0.23    12.52        4.081          0.14

    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        0.75     2.59       7.377
        2        0.62    12.52       4.081

    COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
    PEAK FLOW RATE(CFS) =      0.75   Tc(MIN.) =    2.59
    TOTAL AREA(ACRES) =      0.25
    LONGEST FLOWPATH FROM NODE    116.00 TO NODE    114.00 =   140.00
FEET.


****************************************************************************
    FLOW PROCESS FROM NODE    114.00 TO NODE    106.00 IS CODE =  62
----------------------------------------------------------------------------
    >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
    >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
    UPSTREAM ELEVATION(FEET) =  620.00  DOWNSTREAM ELEVATION(FEET) =
601.00
    STREET LENGTH(FEET) =   260.00   CURB HEIGHT(INCHES) =  8.0
    STREET HALFWIDTH(FEET) = 40.00

    DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
    INSIDE STREET CROSSFALL(DECIMAL) =  0.020
    OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020
```



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

      **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.65
      STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
      STREET FLOW DEPTH(FEET) =  0.23
      HALFSTREET FLOOD WIDTH(FEET) =    3.72
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.04
      PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.17
    STREET FLOW TRAVEL TIME(MIN.) =   0.86   Tc(MIN.) =   3.45
      50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
    NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
    STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  98
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.748
    SUBAREA AREA(ACRES) =    0.28      SUBAREA RUNOFF(CFS) =    1.80
    TOTAL AREA(ACRES) =      0.53        PEAK FLOW RATE(CFS) =
2.93

    END OF SUBAREA STREET FLOW HYDRAULICS:
    DEPTH(FEET) = 0.28   HALFSTREET FLOOD WIDTH(FEET) =   6.04
    FLOW VELOCITY(FEET/SEC.) =  5.28   DEPTH*VELOCITY(FT*FT/SEC.) =
1.47
    LONGEST FLOWPATH FROM NODE    116.00 TO NODE    106.00 =   400.00
FEET.


****************************************************************************
    FLOW PROCESS FROM NODE    106.00 TO NODE    100.00 IS CODE =  62
----------------------------------------------------------------------------
    >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
    >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
    UPSTREAM ELEVATION(FEET) =  601.00  DOWNSTREAM ELEVATION(FEET) =
581.00
    STREET LENGTH(FEET) =   330.00   CURB HEIGHT(INCHES) =  8.0
    STREET HALFWIDTH(FEET) = 40.00

    DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
    INSIDE STREET CROSSFALL(DECIMAL) =  0.020
    OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

```
      **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.11
      STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
      STREET FLOW DEPTH(FEET) =  0.31
      HALFSTREET FLOOD WIDTH(FEET) =    7.80
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.16
      PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.62
    STREET FLOW TRAVEL TIME(MIN.) =   1.07   Tc(MIN.) =   4.52
      50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
    NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
    STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  98
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.798
    SUBAREA AREA(ACRES) =    0.37      SUBAREA RUNOFF(CFS) =    2.37
    TOTAL AREA(ACRES) =      0.90        PEAK FLOW RATE(CFS) =
5.30

    END OF SUBAREA STREET FLOW HYDRAULICS:
    DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =   8.86
    FLOW VELOCITY(FEET/SEC.) =  5.44   DEPTH*VELOCITY(FT*FT/SEC.) =
1.83
    LONGEST FLOWPATH FROM NODE    116.00 TO NODE    100.00 =   730.00
FEET.

****************************************************************************
    FLOW PROCESS FROM NODE    100.00 TO NODE    100.00 IS CODE =  10
----------------------------------------------------------------------------
    >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
    FLOW PROCESS FROM NODE    100.00 TO NODE    100.00 IS CODE =  13
----------------------------------------------------------------------------
    >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
    FLOW PROCESS FROM NODE    113.00 TO NODE    112.00 IS CODE =  21
----------------------------------------------------------------------------
    >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
    RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  92
```



```
    INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
    UPSTREAM ELEVATION(FEET) =    608.50
    DOWNSTREAM ELEVATION(FEET) =    607.50
    ELEVATION DIFFERENCE(FEET) =      1.00
    SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.188
    WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
             THE MAXIMUM OVERLAND FLOW LENGTH =    69.29
             (Reference: Table 3-1B of Hydrology Manual)
             THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc
CALCULATION!
      50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.203
    SUBAREA RUNOFF(CFS) =      0.51
    TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.51


****************************************************************************
    FLOW PROCESS FROM NODE    112.00 TO NODE    111.00 IS CODE =  62

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

============================================================================
    UPSTREAM ELEVATION(FEET) =  607.50  DOWNSTREAM ELEVATION(FEET) =
606.00
    STREET LENGTH(FEET) =   120.00   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) =       1.89
      STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
      STREET FLOW DEPTH(FEET) =  0.26
      HALFSTREET FLOOD WIDTH(FEET) =    5.47
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.05
      PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.53
    STREET FLOW TRAVEL TIME(MIN.) =   0.98   Tc(MIN.) =   6.17
      50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.445
    RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  92
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
    SUBAREA AREA(ACRES) =    0.60      SUBAREA RUNOFF(CFS) =    2.75
    TOTAL AREA(ACRES) =      0.70        PEAK FLOW RATE(CFS) =
3.20
```

```
    END OF SUBAREA STREET FLOW HYDRAULICS:
    DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =   7.66
    FLOW VELOCITY(FEET/SEC.) =  2.23   DEPTH*VELOCITY(FT*FT/SEC.) =
0.67
    LONGEST FLOWPATH FROM NODE    113.00 TO NODE    111.00 =   190.00
FEET.


****************************************************************
    FLOW PROCESS FROM NODE    111.00 TO NODE    109.00 IS CODE =  31

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

================================================================
    ELEVATION DATA: UPSTREAM(FEET) =   602.50  DOWNSTREAM(FEET) =
597.50
    FLOW LENGTH(FEET) =    95.00   MANNING'S N =  0.013
    ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
    DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.6 INCHES
    PIPE-FLOW VELOCITY(FEET/SEC.) =   9.13
    ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
    PIPE-FLOW(CFS) =      3.20
    PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   6.34
    LONGEST FLOWPATH FROM NODE    113.00 TO NODE    109.00 =   285.00
FEET.


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

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

================================================================
    TOTAL NUMBER OF STREAMS =  2
    CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
    TIME OF CONCENTRATION(MIN.) =   6.34
    RAINFALL INTENSITY(INCH/HR) =   6.33
    TOTAL STREAM AREA(ACRES) =     0.70
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.20


****************************************************************
    FLOW PROCESS FROM NODE    110.00 TO NODE    109.50 IS CODE =  21

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

================================================================
    RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  82
```



```
    INITIAL SUBAREA FLOW-LENGTH(FEET) =    95.00
    UPSTREAM ELEVATION(FEET) =    610.00
    DOWNSTREAM ELEVATION(FEET) =    602.00
    ELEVATION DIFFERENCE(FEET) =      8.00
    SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.951
      50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.594
    SUBAREA RUNOFF(CFS) =      0.11
    TOTAL AREA(ACRES) =      0.04   TOTAL RUNOFF(CFS) =      0.11


****************************************************************
    FLOW PROCESS FROM NODE    109.50 TO NODE    109.00 IS CODE =  51

----------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    602.00  DOWNSTREAM(FEET) =
601.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =    90.00   CHANNEL SLOPE =
0.0111
    CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.013   MAXIMUM DEPTH(FEET) =   2.00
      50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.130
    RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  92
    TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.54
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.10
    AVERAGE FLOW DEPTH(FEET) =   0.08   TRAVEL TIME(MIN.) =   0.71
    Tc(MIN.) =   6.66
    SUBAREA AREA(ACRES) =     0.20       SUBAREA RUNOFF(CFS) =    0.87
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.660
    TOTAL AREA(ACRES) =      0.24         PEAK FLOW RATE(CFS) =
0.97

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.11   FLOW VELOCITY(FEET/SEC.) =   2.61
    LONGEST FLOWPATH FROM NODE    110.00 TO NODE    109.00 =   185.00
FEET.


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

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

================================================================
    TOTAL NUMBER OF STREAMS =  2
    CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
    TIME OF CONCENTRATION(MIN.) =   6.66
```

```
RAINFALL INTENSITY(INCH/HR) =   6.13
TOTAL STREAM AREA(ACRES) =     0.24
PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.97

** CONFLUENCE DATA **
STREAM     RUNOFF      Tc      INTENSITY      AREA
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1        3.20     6.34        6.330          0.70
    2        0.97     6.66        6.130          0.24

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        4.13     6.34       6.330
    2        4.07     6.66       6.130

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =      4.13   Tc(MIN.) =    6.34
TOTAL AREA(ACRES) =      0.94
LONGEST FLOWPATH FROM NODE    113.00 TO NODE    109.00 =   285.00
FEET.


****************************************************************************
FLOW PROCESS FROM NODE    109.00 TO NODE    107.00 IS CODE =  31

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

============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   597.50  DOWNSTREAM(FEET) =
592.50
FLOW LENGTH(FEET) =   180.00   MANNING'S N =  0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.1 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   7.80
ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      4.13
PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =   6.72
LONGEST FLOWPATH FROM NODE    113.00 TO NODE    107.00 =   465.00
FEET.


****************************************************************************
FLOW PROCESS FROM NODE    107.00 TO NODE    107.00 IS CODE =   1

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

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



```
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MIN.) =   6.72
RAINFALL INTENSITY(INCH/HR) =   6.09
TOTAL STREAM AREA(ACRES) =     0.94
PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.13


****************************************************************************
FLOW PROCESS FROM NODE    108.00 TO NODE    107.50 IS CODE =  21

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

============================================================================
RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) =  92
INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
UPSTREAM ELEVATION(FEET) =    598.00
DOWNSTREAM ELEVATION(FEET) =    597.50
ELEVATION DIFFERENCE(FEET) =      0.50
SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.964
  50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) =      0.52
TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.52


****************************************************************************
FLOW PROCESS FROM NODE    107.50 TO NODE    107.00 IS CODE =  62

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

============================================================================
UPSTREAM ELEVATION(FEET) =  597.50  DOWNSTREAM ELEVATION(FEET) =
596.00
STREET LENGTH(FEET) =   110.00   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) =       1.47
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
```

```
      STREET FLOW DEPTH(FEET) =  0.24
      HALFSTREET FLOOD WIDTH(FEET) =    4.16
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.12
      PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.50
    STREET FLOW TRAVEL TIME(MIN.) =   0.87   Tc(MIN.) =   5.83
      50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.681
    RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  92
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
    SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    1.90
    TOTAL AREA(ACRES) =      0.50        PEAK FLOW RATE(CFS) =
2.37

    END OF SUBAREA STREET FLOW HYDRAULICS:
    DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   6.22
    FLOW VELOCITY(FEET/SEC.) =  2.20   DEPTH*VELOCITY(FT*FT/SEC.) =
0.60
    LONGEST FLOWPATH FROM NODE    108.00 TO NODE    107.00 =   160.00
FEET.


****************************************************************************
    FLOW PROCESS FROM NODE    107.00 TO NODE    107.00 IS CODE =   1
                                                                            .
----------------------------------------------------------------------------
    >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
    >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
                                                                            .
============================================================================
    TOTAL NUMBER OF STREAMS =  2
    CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
    TIME OF CONCENTRATION(MIN.) =   5.83
    RAINFALL INTENSITY(INCH/HR) =   6.68
    TOTAL STREAM AREA(ACRES) =     0.50
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.37

    ** CONFLUENCE DATA **
    STREAM     RUNOFF      Tc      INTENSITY      AREA
    NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
        1        4.13     6.72        6.094          0.94
        1        4.07     7.05        5.911          0.94
        2        2.37     5.83        6.681          0.50

    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        6.14     5.83       6.681
        2        6.29     6.72       6.094
        3        6.17     7.05       5.911
```



```
    COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
    PEAK FLOW RATE(CFS) =      6.29   Tc(MIN.) =    6.72
    TOTAL AREA(ACRES) =      1.44
    LONGEST FLOWPATH FROM NODE    113.00 TO NODE    107.00 =   465.00
FEET.


****************************************************************************
    FLOW PROCESS FROM NODE    107.00 TO NODE    104.00 IS CODE =  31
                                                                            .
----------------------------------------------------------------------------
    >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
    >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
                                                                            .
============================================================================
    ELEVATION DATA: UPSTREAM(FEET) =   592.50  DOWNSTREAM(FEET) =
585.50
    FLOW LENGTH(FEET) =   130.00   MANNING'S N =  0.013
    ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
    DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.4 INCHES
    PIPE-FLOW VELOCITY(FEET/SEC.) =  11.14
    ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
    PIPE-FLOW(CFS) =      6.29
    PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   6.92
    LONGEST FLOWPATH FROM NODE    113.00 TO NODE    104.00 =   595.00
FEET.


****************************************************************************
    FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =   1
                                                                            .
----------------------------------------------------------------------------
    >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
                                                                            .
============================================================================
    TOTAL NUMBER OF STREAMS =  2
    CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
    TIME OF CONCENTRATION(MIN.) =   6.92
    RAINFALL INTENSITY(INCH/HR) =   5.98
    TOTAL STREAM AREA(ACRES) =     1.44
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.29


                                                                            .
****************************************************************************
    FLOW PROCESS FROM NODE    105.00 TO NODE    104.50 IS CODE =  21
                                                                            .
----------------------------------------------------------------------------
    >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
                                                                            .
============================================================================
    RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  92
    INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
```

```
    UPSTREAM ELEVATION(FEET) =    591.00
    DOWNSTREAM ELEVATION(FEET) =    589.50
    ELEVATION DIFFERENCE(FEET) =      1.50
    SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.442
      50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
    NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
    SUBAREA RUNOFF(CFS) =      0.52
    TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.52


****************************************************************************
    FLOW PROCESS FROM NODE    104.50 TO NODE    104.00 IS CODE =  62
----------------------------------------------------------------------------
    >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
    >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
    UPSTREAM ELEVATION(FEET) =  589.50  DOWNSTREAM ELEVATION(FEET) =
589.00
    STREET LENGTH(FEET) =    70.00   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) =       1.31
      STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
      STREET FLOW DEPTH(FEET) =  0.25
      HALFSTREET FLOOD WIDTH(FEET) =    5.09
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.54
      PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.39
    STREET FLOW TRAVEL TIME(MIN.) =   0.76   Tc(MIN.) =   4.20
      50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.377
    NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
    RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  92
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
    SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    1.57
    TOTAL AREA(ACRES) =      0.40        PEAK FLOW RATE(CFS) =
2.10

    END OF SUBAREA STREET FLOW HYDRAULICS:
    DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   7.09
    FLOW VELOCITY(FEET/SEC.) =  1.63   DEPTH*VELOCITY(FT*FT/SEC.) =
0.47
```



```
    LONGEST FLOWPATH FROM NODE    105.00 TO NODE    104.00 =   120.00
FEET.


****************************************************************************
    FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =   1

----------------------------------------------------------------------------
    >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
    >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
    TOTAL NUMBER OF STREAMS =  2
    CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
    TIME OF CONCENTRATION(MIN.) =   4.20
    RAINFALL INTENSITY(INCH/HR) =   7.38
    TOTAL STREAM AREA(ACRES) =     0.40
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.10

    ** CONFLUENCE DATA **
    STREAM     RUNOFF      Tc      INTENSITY      AREA
    NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
        1        6.14     6.03        6.540         1.44
        1        6.29     6.92        5.983         1.44
        1        6.17     7.24        5.808         1.44
        2        2.10     4.20        7.377         0.40

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

    ** PEAK FLOW RATE TABLE **
    STREAM     RUNOFF      Tc      INTENSITY
    NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
        1        7.53     4.20       7.377
        2        7.99     6.03       6.540
        3        7.99     6.92       5.983
        4        7.82     7.24       5.808

    COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
    PEAK FLOW RATE(CFS) =      7.99   Tc(MIN.) =    6.03
    TOTAL AREA(ACRES) =      1.84
    LONGEST FLOWPATH FROM NODE    113.00 TO NODE    104.00 =   595.00
FEET.


****************************************************************************
    FLOW PROCESS FROM NODE    104.00 TO NODE    103.00 IS CODE =  31

----------------------------------------------------------------------------
    >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
    >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
    ELEVATION DATA: UPSTREAM(FEET) =   585.50  DOWNSTREAM(FEET) =
```

```
585.00
    FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
    ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
    DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.7 INCHES
    PIPE-FLOW VELOCITY(FEET/SEC.) =   8.22
    ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
    PIPE-FLOW(CFS) =      7.99
    PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   6.08
    LONGEST FLOWPATH FROM NODE    113.00 TO NODE    103.00 =   620.00
FEET.


****************************************************************************
    FLOW PROCESS FROM NODE    103.00 TO NODE    100.00 IS CODE =  31

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

============================================================================
    ELEVATION DATA: UPSTREAM(FEET) =   585.00  DOWNSTREAM(FEET) =
577.00
    FLOW LENGTH(FEET) =   135.00   MANNING'S N =  0.013
    ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
    DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.1 INCHES
    PIPE-FLOW VELOCITY(FEET/SEC.) =  12.31
    ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
    PIPE-FLOW(CFS) =      7.99
    PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   6.26
    LONGEST FLOWPATH FROM NODE    113.00 TO NODE    100.00 =   755.00
FEET.


****************************************************************************
    FLOW PROCESS FROM NODE    100.00 TO NODE    100.00 IS CODE =   1

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

============================================================================
    TOTAL NUMBER OF STREAMS =  2
    CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
    TIME OF CONCENTRATION(MIN.) =   6.26
    RAINFALL INTENSITY(INCH/HR) =   6.38
    TOTAL STREAM AREA(ACRES) =     1.84
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.99


****************************************************************************
    FLOW PROCESS FROM NODE    102.00 TO NODE    101.00 IS CODE =  21

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



```
============================================================================
    RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  82
    INITIAL SUBAREA FLOW-LENGTH(FEET) =   180.00
    UPSTREAM ELEVATION(FEET) =    604.00
    DOWNSTREAM ELEVATION(FEET) =    594.00
    ELEVATION DIFFERENCE(FEET) =     10.00
    SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.013
    WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
             THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
             (Reference: Table 3-1B of Hydrology Manual)
             THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc
CALCULATION!
      50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.931
    SUBAREA RUNOFF(CFS) =      0.19
    TOTAL AREA(ACRES) =      0.08   TOTAL RUNOFF(CFS) =      0.19


****************************************************************************
    FLOW PROCESS FROM NODE    101.00 TO NODE    100.00 IS CODE =  51

----------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

============================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    594.00  DOWNSTREAM(FEET) =
581.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   340.00   CHANNEL SLOPE =
0.0382
    CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.045   MAXIMUM DEPTH(FEET) =   2.00
      50 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.257
    RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  82
    TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.37
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.20
    AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   4.72
    Tc(MIN.) =  11.73
    SUBAREA AREA(ACRES) =     0.20       SUBAREA RUNOFF(CFS) =    0.35
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
    TOTAL AREA(ACRES) =      0.28         PEAK FLOW RATE(CFS) =
0.49

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.11   FLOW VELOCITY(FEET/SEC.) =   1.34
    LONGEST FLOWPATH FROM NODE    102.00 TO NODE    100.00 =   520.00
FEET.


****************************************************************************
    FLOW PROCESS FROM NODE    100.00 TO NODE    100.00 IS CODE =   1
```

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

======================================================================
    TOTAL NUMBER OF STREAMS =  2
    CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
    TIME OF CONCENTRATION(MIN.) =  11.73
    RAINFALL INTENSITY(INCH/HR) =   4.26
    TOTAL STREAM AREA(ACRES) =     0.28
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.49

    ** CONFLUENCE DATA **
    STREAM     RUNOFF      Tc      INTENSITY      AREA
    NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
        1        7.53     4.44        7.377          1.84
        1        7.99     6.26        6.382          1.84
        1        7.99     7.15        5.856          1.84
        1        7.82     7.48        5.689          1.84
        2        0.49    11.73        4.257          0.28

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

    ** PEAK FLOW RATE TABLE **
    STREAM     RUNOFF      Tc      INTENSITY
    NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
        1        7.72     4.44       7.377
        2        8.25     6.26       6.382
        3        8.29     7.15       5.856
        4        8.13     7.48       5.689
        5        6.34    11.73       4.257

    COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
    PEAK FLOW RATE(CFS) =      8.29   Tc(MIN.) =    7.15
    TOTAL AREA(ACRES) =      2.12
    LONGEST FLOWPATH FROM NODE    113.00 TO NODE    100.00 =   755.00
FEET.


****************************************************************************
    FLOW PROCESS FROM NODE    100.00 TO NODE    100.00 IS CODE =  11

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

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

    ** MAIN STREAM CONFLUENCE DATA **
    STREAM     RUNOFF     Tc      INTENSITY     AREA
    NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
        1        7.72     4.44       7.377        2.12
        2        8.25     6.26       6.382        2.12
```



```
        3        8.29     7.15       5.856        2.12
        4        8.13     7.48       5.689        2.12
        5        6.34    11.73       4.257        2.12
    LONGEST FLOWPATH FROM NODE    113.00 TO NODE    100.00 =   755.00
FEET.

    ** MEMORY BANK #  1 CONFLUENCE DATA **
    STREAM     RUNOFF      Tc      INTENSITY     AREA
    NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
        1        5.30     4.52       7.377        0.90
        2        2.68    14.43       3.724        0.90
    LONGEST FLOWPATH FROM NODE    116.00 TO NODE    100.00 =   730.00
FEET.

    ** PEAK FLOW RATE TABLE **
    STREAM    RUNOFF       Tc      INTENSITY
    NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
        1      12.92       4.44       7.377
        2      13.02       4.52       7.377
        3      12.84       6.26       6.382
        4      12.50       7.15       5.856
        5      12.22       7.48       5.689
        6       9.40      11.73       4.257
        7       8.22      14.43       3.724

    COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
    PEAK FLOW RATE(CFS) =     13.02   Tc(MIN.) =    4.52
    TOTAL AREA(ACRES) =      3.02


****************************************************************************
    FLOW PROCESS FROM NODE    100.00 TO NODE    100.00 IS CODE =  12

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

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

======================================================================
    END OF STUDY SUMMARY:
    TOTAL AREA(ACRES)     =      3.02  TC(MIN.) =      4.52
    PEAK FLOW RATE(CFS)   =     13.02
    *** PEAK FLOW RATE TABLE ***
           Q(CFS)   Tc(MIN.)
    1       12.92       4.44
    2       13.02       4.52
    3       12.84       6.26
    4       12.50       7.15
    5       12.22       7.48
    6        9.40      11.73
    7        8.22      14.43

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

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

```
____________________________________________________________________
*******************************************************************

              RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
              Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                           2003,1985,1981 HYDROLOGY MANUAL
           (c) Copyright 1982-2003 Advanced Engineering Software (aes)
               Ver. 1.5A Release Date: 01/01/2003  License ID 1553

                                Analysis prepared by:


   ************************** DESCRIPTION OF STUDY
**************************
  * LAGO DE SAN MARCOS
       *
  * 100-YEAR STORM EVENT - PROPOSED CONDITION
       *
  * JN 146-33
       *
*******************************************************************

    FILE NAME: C:\146PR100.DAT
    TIME/DATE OF STUDY: 08:28 07/22/2004
-------------------------------------------------------------------
    USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
-------------------------------------------------------------------
    2003 SAN DIEGO MANUAL CRITERIA

    USER SPECIFIED STORM EVENT(YEAR) = 100.00
    6-HOUR DURATION PRECIPITATION (INCHES) =   3.000
    SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
    SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE
= 0.90
    SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
    NOTE: CONSIDER ALL CONFLUENCE STREAM COMBINATIONS
          FOR ALL 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   40.0     20.0    0.020/0.020/0.020   0.67    2.00 0.0313
0.167 0.0150
    3   60.0     30.0    0.020/0.020/0.020   0.67    2.00 0.0313
0.167 0.0150

    GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
      1. Relative Flow-Depth =  0.40 FEET
         as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
      2. (Depth)*(Velocity) Constraint =  4.0 (FT*FT/S)
    *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
     OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*


*******************************************************************
    FLOW PROCESS FROM NODE    118.00 TO NODE    117.00 IS CODE =  21
-------------------------------------------------------------------
    >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
===================================================================
    STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  98
    INITIAL SUBAREA FLOW-LENGTH(FEET) =    80.00
    UPSTREAM ELEVATION(FEET) =    623.70
    DOWNSTREAM ELEVATION(FEET) =    621.00
    ELEVATION DIFFERENCE(FEET) =      2.70
    SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.469
     100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.904
    NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
    SUBAREA RUNOFF(CFS) =      0.48
    TOTAL AREA(ACRES) =      0.07   TOTAL RUNOFF(CFS) =      0.48


*******************************************************************
    FLOW PROCESS FROM NODE    117.00 TO NODE    114.00 IS CODE =  62
-------------------------------------------------------------------
    >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
    >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
===================================================================
    UPSTREAM ELEVATION(FEET) =  621.00  DOWNSTREAM ELEVATION(FEET) =
620.00
    STREET LENGTH(FEET) =    30.00   CURB HEIGHT(INCHES) =  8.0
    STREET HALFWIDTH(FEET) = 40.00
```

```
    DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
    INSIDE STREET CROSSFALL(DECIMAL) =  0.020
    OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

      **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.62
      STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
      STREET FLOW DEPTH(FEET) =  0.20
      HALFSTREET FLOOD WIDTH(FEET) =    2.00
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.96
      PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.79
    STREET FLOW TRAVEL TIME(MIN.) =   0.13   Tc(MIN.) =   2.59
     100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.904
    NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
    STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  98
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.870
    SUBAREA AREA(ACRES) =    0.04      SUBAREA RUNOFF(CFS) =    0.28
    TOTAL AREA(ACRES) =      0.11        PEAK FLOW RATE(CFS) =
 0.76

    END OF SUBAREA STREET FLOW HYDRAULICS:
    DEPTH(FEET) = 0.20   HALFSTREET FLOOD WIDTH(FEET) =   2.00
    FLOW VELOCITY(FEET/SEC.) =  3.96   DEPTH*VELOCITY(FT*FT/SEC.) =
 0.79
    LONGEST FLOWPATH FROM NODE    118.00 TO NODE    114.00 =   110.00
 FEET.


 ****************************************************************************
    FLOW PROCESS FROM NODE    114.00 TO NODE    114.00 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.) =   2.59
    RAINFALL INTENSITY(INCH/HR) =   7.90
    TOTAL STREAM AREA(ACRES) =     0.11
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.76


 ****************************************************************************
    FLOW PROCESS FROM NODE    116.00 TO NODE    115.00 IS CODE =  21

```



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

 ============================================================================
    RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  82
    INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
    UPSTREAM ELEVATION(FEET) =    621.40
    DOWNSTREAM ELEVATION(FEET) =    621.00
    ELEVATION DIFFERENCE(FEET) =      0.40
    SUBAREA OVERLAND TIME OF FLOW(MIN.) =   10.881
    WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
             THE MAXIMUM OVERLAND FLOW LENGTH =    52.86
             (Reference: Table 3-1B of Hydrology Manual)
             THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc
 CALCULATION!
      100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.787
    SUBAREA RUNOFF(CFS) =      0.14
    TOTAL AREA(ACRES) =      0.07   TOTAL RUNOFF(CFS) =      0.14


 ****************************************************************************
    FLOW PROCESS FROM NODE    115.00 TO NODE    114.00 IS CODE =  51

 ----------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

 ============================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    621.00  DOWNSTREAM(FEET) =
 620.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =    70.00   CHANNEL SLOPE =
 0.0143
    CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.045   MAXIMUM DEPTH(FEET) =   2.00
     100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.370
    RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  82
    TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.20
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.71
    AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   1.65
    Tc(MIN.) =  12.53
    SUBAREA AREA(ACRES) =     0.07       SUBAREA RUNOFF(CFS) =    0.13
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
    TOTAL AREA(ACRES) =      0.14         PEAK FLOW RATE(CFS) =
 0.25

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.10   FLOW VELOCITY(FEET/SEC.) =   0.79
    LONGEST FLOWPATH FROM NODE    116.00 TO NODE    114.00 =   140.00
 FEET.

```

```
****************************************************************************
    FLOW PROCESS FROM NODE    114.00 TO NODE    114.00 IS CODE =   1
----------------------------------------------------------------------------
    >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
    >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
    TOTAL NUMBER OF STREAMS =  2
    CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
    TIME OF CONCENTRATION(MIN.) =  12.53
    RAINFALL INTENSITY(INCH/HR) =   4.37
    TOTAL STREAM AREA(ACRES) =     0.14
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.25

    ** CONFLUENCE DATA **
    STREAM     RUNOFF      Tc      INTENSITY      AREA
    NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
        1        0.76     2.59        7.904          0.11
        2        0.25    12.53        4.370          0.14

    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        0.81     2.59       7.904
        2        0.67    12.53       4.370

    COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
    PEAK FLOW RATE(CFS) =      0.81   Tc(MIN.) =    2.59
    TOTAL AREA(ACRES) =      0.25
    LONGEST FLOWPATH FROM NODE    116.00 TO NODE    114.00 =   140.00
FEET.


****************************************************************************
    FLOW PROCESS FROM NODE    114.00 TO NODE    106.00 IS CODE =  62
----------------------------------------------------------------------------
    >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
    >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
    UPSTREAM ELEVATION(FEET) =  620.00  DOWNSTREAM ELEVATION(FEET) =
601.00
    STREET LENGTH(FEET) =   260.00   CURB HEIGHT(INCHES) =  8.0
    STREET HALFWIDTH(FEET) = 40.00

    DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
    INSIDE STREET CROSSFALL(DECIMAL) =  0.020
    OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020
```



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

      **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.77
      STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
      STREET FLOW DEPTH(FEET) =  0.24
      HALFSTREET FLOOD WIDTH(FEET) =    4.00
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.06
      PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.21
    STREET FLOW TRAVEL TIME(MIN.) =   0.86   Tc(MIN.) =   3.45
     100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.904
    NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
    STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  98
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.748
    SUBAREA AREA(ACRES) =    0.28      SUBAREA RUNOFF(CFS) =    1.93
    TOTAL AREA(ACRES) =      0.53        PEAK FLOW RATE(CFS) =
3.14

    END OF SUBAREA STREET FLOW HYDRAULICS:
    DEPTH(FEET) = 0.28   HALFSTREET FLOOD WIDTH(FEET) =   6.32
    FLOW VELOCITY(FEET/SEC.) =  5.32   DEPTH*VELOCITY(FT*FT/SEC.) =
1.51
    LONGEST FLOWPATH FROM NODE    116.00 TO NODE    106.00 =   400.00
FEET.


****************************************************************************
    FLOW PROCESS FROM NODE    106.00 TO NODE    100.00 IS CODE =  62
----------------------------------------------------------------------------
    >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
    >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
    UPSTREAM ELEVATION(FEET) =  601.00  DOWNSTREAM ELEVATION(FEET) =
581.00
    STREET LENGTH(FEET) =   330.00   CURB HEIGHT(INCHES) =  8.0
    STREET HALFWIDTH(FEET) = 40.00

    DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
    INSIDE STREET CROSSFALL(DECIMAL) =  0.020
    OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

```
      **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.41
      STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
      STREET FLOW DEPTH(FEET) =  0.32
      HALFSTREET FLOOD WIDTH(FEET) =    8.08
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.23
      PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.67
    STREET FLOW TRAVEL TIME(MIN.) =   1.05   Tc(MIN.) =   4.50
     100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.904
    NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
    STREETS & ROADS (CURBS/STORM DRAINS) RUNOFF COEFFICIENT = .8700
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  98
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.798
    SUBAREA AREA(ACRES) =    0.37      SUBAREA RUNOFF(CFS) =    2.54
    TOTAL AREA(ACRES) =      0.90        PEAK FLOW RATE(CFS) =
5.68

    END OF SUBAREA STREET FLOW HYDRAULICS:
    DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =   9.14
    FLOW VELOCITY(FEET/SEC.) =  5.55   DEPTH*VELOCITY(FT*FT/SEC.) =
1.89
    LONGEST FLOWPATH FROM NODE    116.00 TO NODE    100.00 =   730.00
FEET.

****************************************************************************
    FLOW PROCESS FROM NODE    100.00 TO NODE    100.00 IS CODE =  10
----------------------------------------------------------------------------
    >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
    FLOW PROCESS FROM NODE    100.00 TO NODE    100.00 IS CODE =  13
----------------------------------------------------------------------------
    >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
    FLOW PROCESS FROM NODE    113.00 TO NODE    112.00 IS CODE =  21
----------------------------------------------------------------------------
    >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
    RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  92
```



```
    INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
    UPSTREAM ELEVATION(FEET) =    608.50
    DOWNSTREAM ELEVATION(FEET) =    607.50
    ELEVATION DIFFERENCE(FEET) =      1.00
    SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.188
    WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
             THE MAXIMUM OVERLAND FLOW LENGTH =    69.29
             (Reference: Table 3-1B of Hydrology Manual)
             THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc
CALCULATION!
     100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.718
    SUBAREA RUNOFF(CFS) =      0.55
    TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.55


****************************************************************************
    FLOW PROCESS FROM NODE    112.00 TO NODE    111.00 IS CODE =  62

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

============================================================================
    UPSTREAM ELEVATION(FEET) =  607.50  DOWNSTREAM ELEVATION(FEET) =
606.00
    STREET LENGTH(FEET) =   120.00   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) =       2.02
      STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
      STREET FLOW DEPTH(FEET) =  0.26
      HALFSTREET FLOOD WIDTH(FEET) =    5.72
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.08
      PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.55
    STREET FLOW TRAVEL TIME(MIN.) =   0.96   Tc(MIN.) =   6.15
     100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.916
    RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  92
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
    SUBAREA AREA(ACRES) =    0.60      SUBAREA RUNOFF(CFS) =    2.95
    TOTAL AREA(ACRES) =      0.70        PEAK FLOW RATE(CFS) =
3.44
```

```
    END OF SUBAREA STREET FLOW HYDRAULICS:
    DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =   7.97
    FLOW VELOCITY(FEET/SEC.) =  2.26   DEPTH*VELOCITY(FT*FT/SEC.) =
0.69
    LONGEST FLOWPATH FROM NODE    113.00 TO NODE    111.00 =   190.00
FEET.


****************************************************************************
    FLOW PROCESS FROM NODE    111.00 TO NODE    109.00 IS CODE =  31

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

============================================================================
    ELEVATION DATA: UPSTREAM(FEET) =   602.50  DOWNSTREAM(FEET) =
597.50
    FLOW LENGTH(FEET) =    95.00   MANNING'S N =  0.013
    ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
    DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.7 INCHES
    PIPE-FLOW VELOCITY(FEET/SEC.) =   9.31
    ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
    PIPE-FLOW(CFS) =      3.44
    PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   6.32
    LONGEST FLOWPATH FROM NODE    113.00 TO NODE    109.00 =   285.00
FEET.


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

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

============================================================================
    TOTAL NUMBER OF STREAMS =  2
    CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
    TIME OF CONCENTRATION(MIN.) =   6.32
    RAINFALL INTENSITY(INCH/HR) =   6.80
    TOTAL STREAM AREA(ACRES) =     0.70
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.44


****************************************************************************
    FLOW PROCESS FROM NODE    110.00 TO NODE    109.50 IS CODE =  21

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

============================================================================
    RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  82
```



```
    INITIAL SUBAREA FLOW-LENGTH(FEET) =    95.00
    UPSTREAM ELEVATION(FEET) =    610.00
    DOWNSTREAM ELEVATION(FEET) =    602.00
    ELEVATION DIFFERENCE(FEET) =      8.00
    SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.951
     100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.065
    SUBAREA RUNOFF(CFS) =      0.12
    TOTAL AREA(ACRES) =      0.04   TOTAL RUNOFF(CFS) =      0.12


****************************************************************************
    FLOW PROCESS FROM NODE    109.50 TO NODE    109.00 IS CODE =  51

----------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

============================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    602.00  DOWNSTREAM(FEET) =
601.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =    90.00   CHANNEL SLOPE =
0.0111
    CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.013   MAXIMUM DEPTH(FEET) =   2.00
     100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.588
    RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  92
    TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.58
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.20
    AVERAGE FLOW DEPTH(FEET) =   0.08   TRAVEL TIME(MIN.) =   0.68
    Tc(MIN.) =   6.63
    SUBAREA AREA(ACRES) =     0.20       SUBAREA RUNOFF(CFS) =    0.94
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.660
    TOTAL AREA(ACRES) =      0.24         PEAK FLOW RATE(CFS) =
1.04

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.12   FLOW VELOCITY(FEET/SEC.) =   2.65
    LONGEST FLOWPATH FROM NODE    110.00 TO NODE    109.00 =   185.00
FEET.


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

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

============================================================================
    TOTAL NUMBER OF STREAMS =  2
    CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
    TIME OF CONCENTRATION(MIN.) =   6.63
```

```
RAINFALL INTENSITY(INCH/HR) =   6.59
TOTAL STREAM AREA(ACRES) =     0.24
PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.04

** CONFLUENCE DATA **
STREAM     RUNOFF      Tc      INTENSITY      AREA
NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
    1        3.44     6.32        6.796          0.70
    2        1.04     6.63        6.588          0.24

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        4.43     6.32       6.796
    2        4.38     6.63       6.588

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =      4.43   Tc(MIN.) =    6.32
TOTAL AREA(ACRES) =      0.94
LONGEST FLOWPATH FROM NODE    113.00 TO NODE    109.00 =   285.00
FEET.


****************************************************************************
FLOW PROCESS FROM NODE    109.00 TO NODE    107.00 IS CODE =  31

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

============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   597.50  DOWNSTREAM(FEET) =
592.50
FLOW LENGTH(FEET) =   180.00   MANNING'S N =  0.013
ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   7.96
ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      4.43
PIPE TRAVEL TIME(MIN.) =   0.38    Tc(MIN.) =   6.70
LONGEST FLOWPATH FROM NODE    113.00 TO NODE    107.00 =   465.00
FEET.


****************************************************************************
FLOW PROCESS FROM NODE    107.00 TO NODE    107.00 IS CODE =   1

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

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



```
TOTAL NUMBER OF STREAMS =  2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
TIME OF CONCENTRATION(MIN.) =   6.70
RAINFALL INTENSITY(INCH/HR) =   6.55
TOTAL STREAM AREA(ACRES) =     0.94
PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.43


****************************************************************************
FLOW PROCESS FROM NODE    108.00 TO NODE    107.50 IS CODE =  21

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

============================================================================
RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
SOIL CLASSIFICATION IS "D"
S.C.S. CURVE NUMBER (AMC II) =  92
INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
UPSTREAM ELEVATION(FEET) =    598.00
DOWNSTREAM ELEVATION(FEET) =    597.50
ELEVATION DIFFERENCE(FEET) =      0.50
SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.964
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.904
NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
SUBAREA RUNOFF(CFS) =      0.56
TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.56


****************************************************************************
FLOW PROCESS FROM NODE    107.50 TO NODE    107.00 IS CODE =  62

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

============================================================================
UPSTREAM ELEVATION(FEET) =  597.50  DOWNSTREAM ELEVATION(FEET) =
596.00
STREET LENGTH(FEET) =   110.00   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) =       1.58
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
```

```
      STREET FLOW DEPTH(FEET) =  0.24
      HALFSTREET FLOOD WIDTH(FEET) =    4.47
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.12
      PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.51
    STREET FLOW TRAVEL TIME(MIN.) =   0.86   Tc(MIN.) =   5.83
     100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.160
    RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  92
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
    SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    2.03
    TOTAL AREA(ACRES) =      0.50        PEAK FLOW RATE(CFS) =
2.54

    END OF SUBAREA STREET FLOW HYDRAULICS:
    DEPTH(FEET) = 0.28   HALFSTREET FLOOD WIDTH(FEET) =   6.53
    FLOW VELOCITY(FEET/SEC.) =  2.21   DEPTH*VELOCITY(FT*FT/SEC.) =
0.62
    LONGEST FLOWPATH FROM NODE    108.00 TO NODE    107.00 =   160.00
FEET.


****************************************************************************
    FLOW PROCESS FROM NODE    107.00 TO NODE    107.00 IS CODE =   1

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

============================================================================
    TOTAL NUMBER OF STREAMS =  2
    CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
    TIME OF CONCENTRATION(MIN.) =   5.83
    RAINFALL INTENSITY(INCH/HR) =   7.16
    TOTAL STREAM AREA(ACRES) =     0.50
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.54

    ** CONFLUENCE DATA **
    STREAM     RUNOFF      Tc      INTENSITY      AREA
    NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
        1        4.43     6.70        6.547          0.94
        1        4.38     7.01        6.356          0.94
        2        2.54     5.83        7.160          0.50

    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        6.59     5.83       7.160
        2        6.76     6.70       6.547
        3        6.63     7.01       6.356
```



```
    COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
    PEAK FLOW RATE(CFS) =      6.76   Tc(MIN.) =    6.70
    TOTAL AREA(ACRES) =      1.44
    LONGEST FLOWPATH FROM NODE    113.00 TO NODE    107.00 =   465.00
FEET.


****************************************************************************
    FLOW PROCESS FROM NODE    107.00 TO NODE    104.00 IS CODE =  31

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

============================================================================
    ELEVATION DATA: UPSTREAM(FEET) =   592.50  DOWNSTREAM(FEET) =
585.50
    FLOW LENGTH(FEET) =   130.00   MANNING'S N =  0.013
    ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
    DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.7 INCHES
    PIPE-FLOW VELOCITY(FEET/SEC.) =  11.35
    ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
    PIPE-FLOW(CFS) =      6.76
    PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   6.89
    LONGEST FLOWPATH FROM NODE    113.00 TO NODE    104.00 =   595.00
FEET.


****************************************************************************
    FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =   1

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

============================================================================
    TOTAL NUMBER OF STREAMS =  2
    CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
    TIME OF CONCENTRATION(MIN.) =   6.89
    RAINFALL INTENSITY(INCH/HR) =   6.43
    TOTAL STREAM AREA(ACRES) =     1.44
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.76


****************************************************************************
    FLOW PROCESS FROM NODE    105.00 TO NODE    104.50 IS CODE =  21

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

============================================================================
    RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  92
    INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
```

```
    UPSTREAM ELEVATION(FEET) =    591.00
    DOWNSTREAM ELEVATION(FEET) =    589.50
    ELEVATION DIFFERENCE(FEET) =      1.50
    SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.442
     100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.904
    NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
    SUBAREA RUNOFF(CFS) =      0.56
    TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.56


****************************************************************************
    FLOW PROCESS FROM NODE    104.50 TO NODE    104.00 IS CODE =  62
----------------------------------------------------------------------------
    >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
    >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
    UPSTREAM ELEVATION(FEET) =  589.50  DOWNSTREAM ELEVATION(FEET) =
589.00
    STREET LENGTH(FEET) =    70.00   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) =       1.40
      STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
      STREET FLOW DEPTH(FEET) =  0.26
      HALFSTREET FLOOD WIDTH(FEET) =    5.41
      AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.54
      PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.40
    STREET FLOW TRAVEL TIME(MIN.) =   0.76   Tc(MIN.) =   4.20
     100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.904
    NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
    RESIDENTAIL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  92
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
    SUBAREA AREA(ACRES) =    0.30      SUBAREA RUNOFF(CFS) =    1.68
    TOTAL AREA(ACRES) =      0.40        PEAK FLOW RATE(CFS) =
2.24

    END OF SUBAREA STREET FLOW HYDRAULICS:
    DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   7.34
    FLOW VELOCITY(FEET/SEC.) =  1.66   DEPTH*VELOCITY(FT*FT/SEC.) =
0.49
```



```
    LONGEST FLOWPATH FROM NODE    105.00 TO NODE    104.00 =   120.00
FEET.


****************************************************************************
    FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =   1
----------------------------------------------------------------------------
    >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
    >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
    TOTAL NUMBER OF STREAMS =  2
    CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
    TIME OF CONCENTRATION(MIN.) =   4.20
    RAINFALL INTENSITY(INCH/HR) =   7.90
    TOTAL STREAM AREA(ACRES) =     0.40
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.24

    ** CONFLUENCE DATA **
    STREAM     RUNOFF      Tc      INTENSITY      AREA
    NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
        1        6.59     6.02        7.012         1.44
        1        6.76     6.89        6.429         1.44
        1        6.63     7.20        6.247         1.44
        2        2.24     4.20        7.904         0.40

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

    ** PEAK FLOW RATE TABLE **
    STREAM     RUNOFF      Tc      INTENSITY
    NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
        1        8.09     4.20       7.904
        2        8.59     6.02       7.012
        3        8.58     6.89       6.429
        4        8.41     7.20       6.247

    COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
    PEAK FLOW RATE(CFS) =      8.59   Tc(MIN.) =    6.02
    TOTAL AREA(ACRES) =      1.84
    LONGEST FLOWPATH FROM NODE    113.00 TO NODE    104.00 =   595.00
FEET.


****************************************************************************
    FLOW PROCESS FROM NODE    104.00 TO NODE    103.00 IS CODE =  31
----------------------------------------------------------------------------
    >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
    >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
    ELEVATION DATA: UPSTREAM(FEET) =   585.50  DOWNSTREAM(FEET) =
```

```
585.00
    FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
    ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
    DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.1 INCHES
    PIPE-FLOW VELOCITY(FEET/SEC.) =   8.37
    ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
    PIPE-FLOW(CFS) =      8.59
    PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   6.07
    LONGEST FLOWPATH FROM NODE    113.00 TO NODE    103.00 =   620.00
FEET.


****************************************************************************
    FLOW PROCESS FROM NODE    103.00 TO NODE    100.00 IS CODE =  31

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

============================================================================
    ELEVATION DATA: UPSTREAM(FEET) =   585.00  DOWNSTREAM(FEET) =
577.00
    FLOW LENGTH(FEET) =   135.00   MANNING'S N =  0.013
    ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
    DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.4 INCHES
    PIPE-FLOW VELOCITY(FEET/SEC.) =  12.55
    ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
    PIPE-FLOW(CFS) =      8.59
    PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   6.25
    LONGEST FLOWPATH FROM NODE    113.00 TO NODE    100.00 =   755.00
FEET.


****************************************************************************
    FLOW PROCESS FROM NODE    100.00 TO NODE    100.00 IS CODE =   1

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

============================================================================
    TOTAL NUMBER OF STREAMS =  2
    CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
    TIME OF CONCENTRATION(MIN.) =   6.25
    RAINFALL INTENSITY(INCH/HR) =   6.84
    TOTAL STREAM AREA(ACRES) =     1.84
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.59


****************************************************************************
    FLOW PROCESS FROM NODE    102.00 TO NODE    101.00 IS CODE =  21

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



```
============================================================================
    RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  82
    INITIAL SUBAREA FLOW-LENGTH(FEET) =   180.00
    UPSTREAM ELEVATION(FEET) =    604.00
    DOWNSTREAM ELEVATION(FEET) =    594.00
    ELEVATION DIFFERENCE(FEET) =     10.00
    SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.013
    WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
             THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
             (Reference: Table 3-1B of Hydrology Manual)
             THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc
CALCULATION!
     100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.355
    SUBAREA RUNOFF(CFS) =      0.10
    TOTAL AREA(ACRES) =      0.04   TOTAL RUNOFF(CFS) =      0.10


****************************************************************************
    FLOW PROCESS FROM NODE    101.00 TO NODE    100.00 IS CODE =  51

----------------------------------------------------------------------------
    >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
    >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<

============================================================================
    ELEVATION DATA: UPSTREAM(FEET) =    594.00  DOWNSTREAM(FEET) =
581.00
    CHANNEL LENGTH THRU SUBAREA(FEET) =   340.00   CHANNEL SLOPE =
0.0382
    CHANNEL BASE(FEET) =    3.00   "Z" FACTOR =   3.000
    MANNING'S FACTOR = 0.045   MAXIMUM DEPTH(FEET) =   2.00
     100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.503
    RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .4100
    SOIL CLASSIFICATION IS "D"
    S.C.S. CURVE NUMBER (AMC II) =  82
    TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      0.29
    TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.15
    AVERAGE FLOW DEPTH(FEET) =   0.08   TRAVEL TIME(MIN.) =   4.95
    Tc(MIN.) =  11.96
    SUBAREA AREA(ACRES) =     0.20       SUBAREA RUNOFF(CFS) =    0.37
    AREA-AVERAGE RUNOFF COEFFICIENT =  0.410
    TOTAL AREA(ACRES) =      0.24         PEAK FLOW RATE(CFS) =
0.44

    END OF SUBAREA CHANNEL FLOW HYDRAULICS:
    DEPTH(FEET) =  0.10   FLOW VELOCITY(FEET/SEC.) =   1.31
    LONGEST FLOWPATH FROM NODE    102.00 TO NODE    100.00 =   520.00
FEET.


****************************************************************************
    FLOW PROCESS FROM NODE    100.00 TO NODE    100.00 IS CODE =   1
```

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

======================================================================
    TOTAL NUMBER OF STREAMS =  2
    CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
    TIME OF CONCENTRATION(MIN.) =  11.96
    RAINFALL INTENSITY(INCH/HR) =   4.50
    TOTAL STREAM AREA(ACRES) =     0.24
    PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.44

    ** CONFLUENCE DATA **
    STREAM     RUNOFF      Tc      INTENSITY      AREA
    NUMBER      (CFS)    (MIN.)   (INCH/HOUR)    (ACRE)
        1        8.09     4.43        7.904          1.84
        1        8.59     6.25        6.845          1.84
        1        8.58     7.12        6.295          1.84
        1        8.41     7.43        6.121          1.84
        2        0.44    11.96        4.503          0.24

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

    ** PEAK FLOW RATE TABLE **
    STREAM     RUNOFF      Tc      INTENSITY
    NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
        1        8.26     4.43       7.904
        2        8.82     6.25       6.845
        3        8.85     7.12       6.295
        4        8.68     7.43       6.121
        5        6.63    11.96       4.503

    COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
    PEAK FLOW RATE(CFS) =      8.85   Tc(MIN.) =    7.12
    TOTAL AREA(ACRES) =      2.08
    LONGEST FLOWPATH FROM NODE    113.00 TO NODE    100.00 =   755.00
FEET.


**********************************************************************
    FLOW PROCESS FROM NODE    100.00 TO NODE    100.00 IS CODE =  11
----------------------------------------------------------------------
    >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<

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

    ** MAIN STREAM CONFLUENCE DATA **
    STREAM     RUNOFF     Tc      INTENSITY     AREA
    NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
        1        8.26     4.43       7.904        2.08
        2        8.82     6.25       6.845        2.08
```



```
        3        8.85     7.12       6.295        2.08
        4        8.68     7.43       6.121        2.08
        5        6.63    11.96       4.503        2.08
    LONGEST FLOWPATH FROM NODE    113.00 TO NODE    100.00 =   755.00
FEET.

    ** MEMORY BANK #  1 CONFLUENCE DATA **
    STREAM     RUNOFF      Tc      INTENSITY     AREA
    NUMBER      (CFS)   (MIN.)   (INCH/HOUR)   (ACRE)
        1        5.68     4.50       7.904        0.90
        2        2.87    14.43       3.990        0.90
    LONGEST FLOWPATH FROM NODE    116.00 TO NODE    100.00 =   730.00
FEET.

    ** PEAK FLOW RATE TABLE **
    STREAM    RUNOFF       Tc      INTENSITY
    NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
        1      13.85       4.43        7.904
        2      13.94       4.50        7.904
        3      13.74       6.25        6.845
        4      13.37       7.12        6.295
        5      13.08       7.43        6.121
        6       9.86      11.96        4.503
        7       8.74      14.43        3.990

    COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
    PEAK FLOW RATE(CFS) =     13.94   Tc(MIN.) =    4.50
    TOTAL AREA(ACRES) =      2.98


**********************************************************************
    FLOW PROCESS FROM NODE    100.00 TO NODE    100.00 IS CODE =  12
----------------------------------------------------------------------
    >>>>>CLEAR MEMORY BANK # 1 <<<<<

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

======================================================================
    END OF STUDY SUMMARY:
    TOTAL AREA(ACRES)     =      2.98  TC(MIN.) =      4.50
    PEAK FLOW RATE(CFS)   =     13.94
    *** PEAK FLOW RATE TABLE ***
           Q(CFS)   Tc(MIN.)
    1       13.85       4.43
    2       13.94       4.50
    3       13.74       6.25
    4       13.37       7.12
    5       13.08       7.43
    6        9.86      11.96
    7        8.74      14.43

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

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

100-Yr Discharge onto Lake San Marcos Drive
Worksheet for Gutter Section

Project Description	
Worksheet	Gutter Section -
Type	Gutter Section
Solve For	Spread

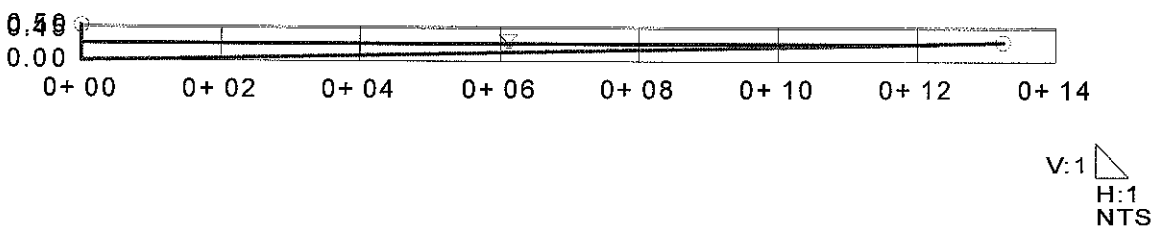
Input Data		
Channel Slope	058800	ft/ft
Discharge	12.30	cfs
Gutter Width	1.50	ft
Gutter Cross Slop	0.020	ft/ft
Road Cross Slop	0.020	ft/ft
Mannings Coeffic	0.013	

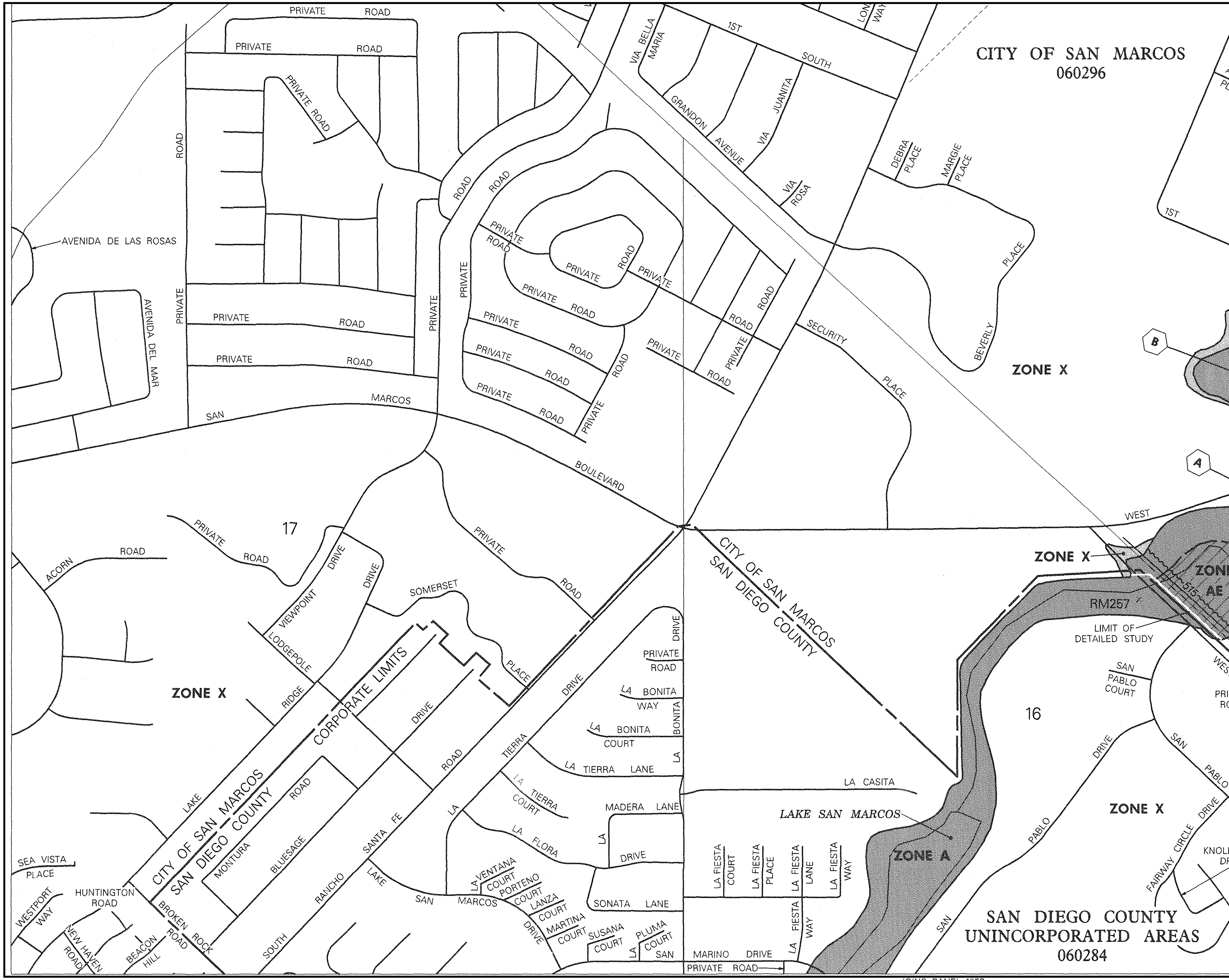
Results		
Spread	12.26	ft
Flow Area	1.5	ft^2
Depth	0.25	ft
Gutter Depress	0.0	in
Velocity	8.18	ft/s

Cross Section - Lake San Marcos Drive
Cross Section for Gutter Section

Project Description	
Worksheet	Gutter Section -
Type	Gutter Section
Solve For	Spread

Section Data		
Channel Slope	058800	ft/ft
Discharge	12.30	cfs
Gutter Width	1.50	ft
Gutter Cross Slo	0.020	ft/ft
Road Cross Slop	0.020	ft/ft
Spread	12.26	ft
Mannings Coeffic	0.013	





APPROXIMATE SCALE IN FEET

500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

SAN DIEGO COUNTY, CALIFORNIA AND INCORPORATED AREAS

PANEL 789 OF 2375

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
SAN DIEGO COUNTY, UNINCORPORATED AREAS	060284	0789	G
SAN MARCOS, CITY OF	060296	0789	G
VISTA, CITY OF	060297	0789	G

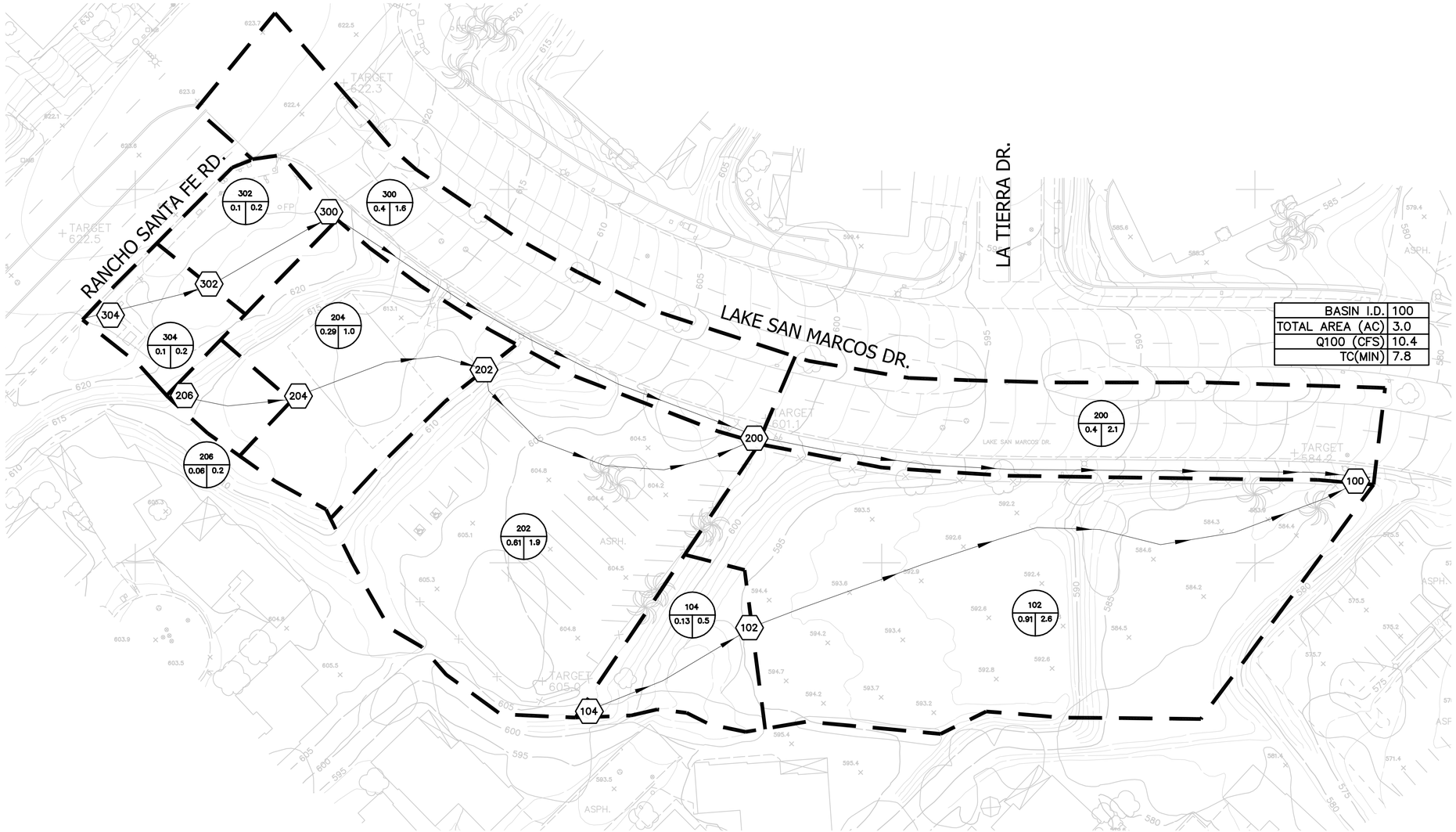
MAP NUMBER 06073C0789 G

MAP REVISED: JUNE 16, 1999

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

LAGO DE SAN MARCOS
EXISTING CONDITION HYDROLOGY MAP



LEGEND

SUB–BASIN NUMBER — A–1
BASIN AREA (AC) — 5.1
SUB–BASIN Q100 (cfs) — 14.6

NODE NUMBER — 204

BASIN LIMITS

FLOW PATH

GRAPHIC SCALE

30 0 15 30 120 240

(IN FEET)
1 inch = 30 ft.

EXHIBIT D

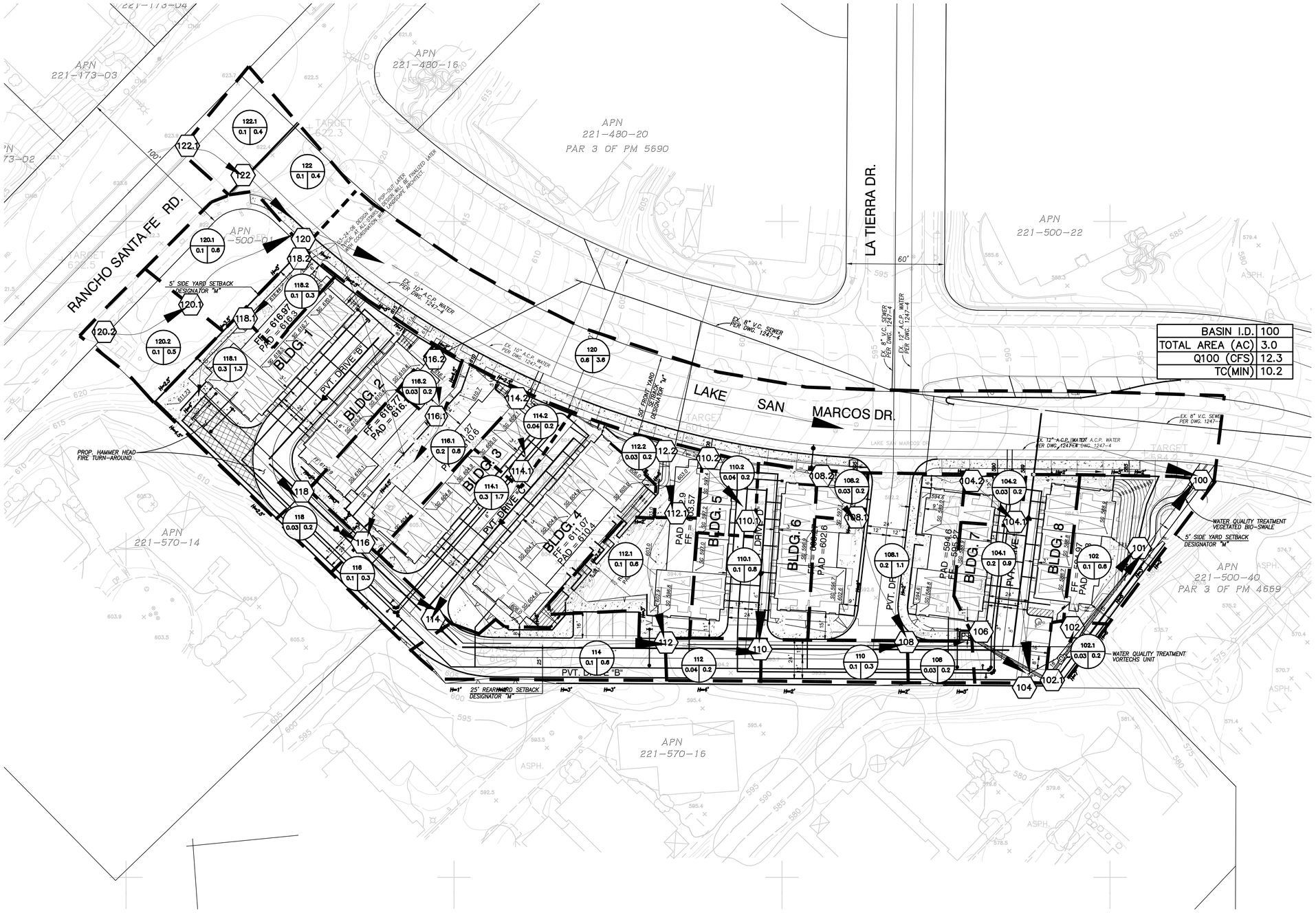
LAGO DE SAN MARCOS
EXISTING CONDITION
HYDROLOGY MAP

PREPARED BY:

Lundstrom +associates
| PLANNING | CIVIL ENGINEERING | LAND SURVEYING |

1764 San Diego Avenue, Suite 200
San Diego, CA 92110
Tel: 619.641.5900 Fax: 619.641.5910

LAGO DE SAN MARCOS
PROPOSED CONDITION HYDROLOGY MAP



BASIN I.D.	100
TOTAL AREA (AC)	3.0
Q100 (CFS)	12.3
TC(MIN)	10.2

EXHIBIT E

LAGO DE SAN MARCOS
PROPOSED CONDITION
HYDROLOGY MAP

PREPARED BY:

Lundstrom +associates

| PLANNING | CIVIL ENGINEERING | LAND SURVEYING |

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J.N. (146-33)

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