CONCEPTUAL HYDROLOGY STUDY

FOR

THE DIAMOND

In the City of

LAKE ELSINORE, CALIFORNIA

Prepared For:

JIC-CP Diamond Development, LLC

Prepared By:

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EXISTING DETENTION BASIN MAP ..... SHEET 1 OF 1

PROPOSED HYDROLOGY MAP ..... SHEET 1 OF 1

I. PROJECT DESCRIPTION

The Diamond Project is a development of approximately 87.2 acres, consisting of approximately 44.2 acres of Mixed Use including the existing Diamond Stadium, 23.7 acres of Commercial Development, 2.0 acres of Open Space, 5.6 acres of Roads, and 11.7 acres of Residential Development.. The project site may be viewed as two distinct segments. The portion north of Malaga Road around the existing Diamond Stadium is commercial development. The south portion of the project is residential development. A portion of the project is located within the FEMA Special Flood Hazards Zone AE (100-yr frequency base flood elevation of 1263). The southwesterly open space area is proposed for use in providing compensating flood storage for the project in conformance with conditions contained in the ACOE Lake Management Project 404 permit.

II. LEVEL OF PROTECTION

The Riverside County Subdivision Ordinance (Number 460) has required protection of all new subdivisions from the 100-year flood event. This criteria has been the basis for the preliminary design of all street grades and storm drain improvements within the project.

For the purpose of the storm drain design, all sizing will be based on the 100 year storm. To protect properties from flooding when the water surface reaches 1263.3, secondary overflows have been located at all sump locations throughout the development to ensure flood waters are capable of flowing on the surface to the designated flood storage areas. Secondary overflows will also provide protection in the event of clogging of the catch basins during the smaller storms.

The project is not located within a County of Riverside drainage area master plan.

In accordance with the City of Lake Elsinore municipal code, all finished floor elevations within the proposed development must be set at elevation 1267.0, which is 3.7 feet above the 100-year flood water surface elevation of 1263.3.

III. HYDROLOGY

The hydrologic calculations were performed in accordance with the County of Riverside Hydrology Manual (April 1978). "CIVILDESIGN" software, marketed by Joseph Bonadiman & Associates, Inc. of San Bernardino, was used to perform the drainage models of the site.

Rainfall

The computer program stores a rainfall database corresponding to the County of Riverside Hydrology Manual (October 1986), which provides the required time versus intensity data for various areas within Riverside County.

Infiltration

Based on the soil maps in the Hydrology Manual, soil type "D" was used in the hydrology calculations. The computer program calculates run-off loss rates based on the selected soil type and various development types.

Rational Method

The Rational Method was used to determine peak flow rates. This information will be used for determining the location and sizes of the proposed storm drain systems.

Existing Drainage

As shown in the Existing Hydrology Exhibit, the Diamond Project currently drains to five outlet concentration points. Sub-area A collects the majority of the site (58.2 acres) including the Stadium, several vacant lots, and the roadway drainage accumulated along Pete Lehr Drive, Railroad Canyon Road, Campbell Street, and a portion of Lakeshore/Mission Trail Drive. This flow is collected and discharged at the terminus of Pete Lehr Drive and empties directly into Lake Elsinore. Sub-area B conveys a portion of the existing Stadium parking lot drainage and also discharges directly into Lake Elsinore through a separate drainage channel. Sub-area C collects drainage from the remainder of the Stadium parking lot, Malaga Road, and a portion of the temporary Stadium overflow parking lot. This flow is collected and discharged to water quality features and a detention basin with the Summerly Development adjacent to the golf course. Storm water within the detention basin is discharged into the remainder of the back basin of Lake Elsinore by pumping. Sub-Area D and E collect the existing development at the north end of the project and discharge directly into the Lake Elsinore inlet channel through existing storm drain connections. The 100-year discharge associated with these five existing sub-areas is 205.7 cfs.

Developed Condition

As shown in the Proposed Hydrology Exhibit, the proposed Diamond Project will drain to three outlet concentration points. Sub-area A will collect the majority of the project (69.1 acres) through the proposed backbone storm drain system within the proposed roadway (Diamond) as well as the existing roadway drainage accumulated along Railroad Canyon Road, Campbell Street, and a portion of Lakeshore/Mission Trail Drive. This backbone storm drain system will parallel the existing storm drain system located at the end of Malaga Road and will discharge to water quality features and a detention basin with the Summerly Development adjacent to the golf course. Sub-area B will utilize the existing

drainage outlet at the north end of the project. Water quality for this sub-area will utilize grassy drainage swales as the flow discharges directly into the Lake Elsinore inlet channel. Sub-Area C collects the existing drainage from the majority of the Stadium parking lot, Malaga Road, and the proposed development south of Malaga. The drainage patterns for this area remain unchanged and will continue to discharge to the existing storm drain located at the end of Malaga. The 100-year discharge associated with these three proposed sub-areas is 226.7 cfs. The existing detention area within the Summerly Development is proposed to serve the increased storm flows.

Appendix C presents an analysis of the proposed project storm flows to the existing detention basin with the Summerly Development. The analysis presents the storm drain facilities required for conveyance of project flows to the existing detention basin. Expected water surface elevations within the detention basin based on project storm flows are presented. The increase in water surface elevations due to the project are insignificant as compared to the existing condition and do not have an adverse affect on the Summerly golf course.

Flood Storage Volumes

The existing flood storage volume within the project area is estimated at 39 acre-feet (up to elevation 1263.3 NAVD 29). The proposed plan provides for 22 acre-feet of flood storage with the additional 17 acre-feet of flood storage being provided within the open space to the southwest of the project.

IV. CONCLUSION

The proposed Diamond Drainage Plan provides for safe conveyance of storm water from the project site to existing drainage infrastructure constructed with the Summerly Development on the south side of the project. The proposed improvements yield an approximate 10 percent increase in peak discharge values. The Drainage Plan utilizes previously planned storm water detention, water quality features and flood control measures within the back basin of Lake Elsinore. New detention facilities are therefore not required for the project. The drainage facilities within the project are to be sized to convey the 100-year frequency peak storm flows. Additional storm drain facilities within the Summerly detention and water quality pond areas are required to convey the project storm flows. The drainage facilities are to be designed in conformance with City of Lake Elsinore and Riverside County Flood Control and Water Conservation District standards.

V. REFERENCES

1. Hydrology Manual, Riverside County Flood Control and Water Conservation District, April 1978.

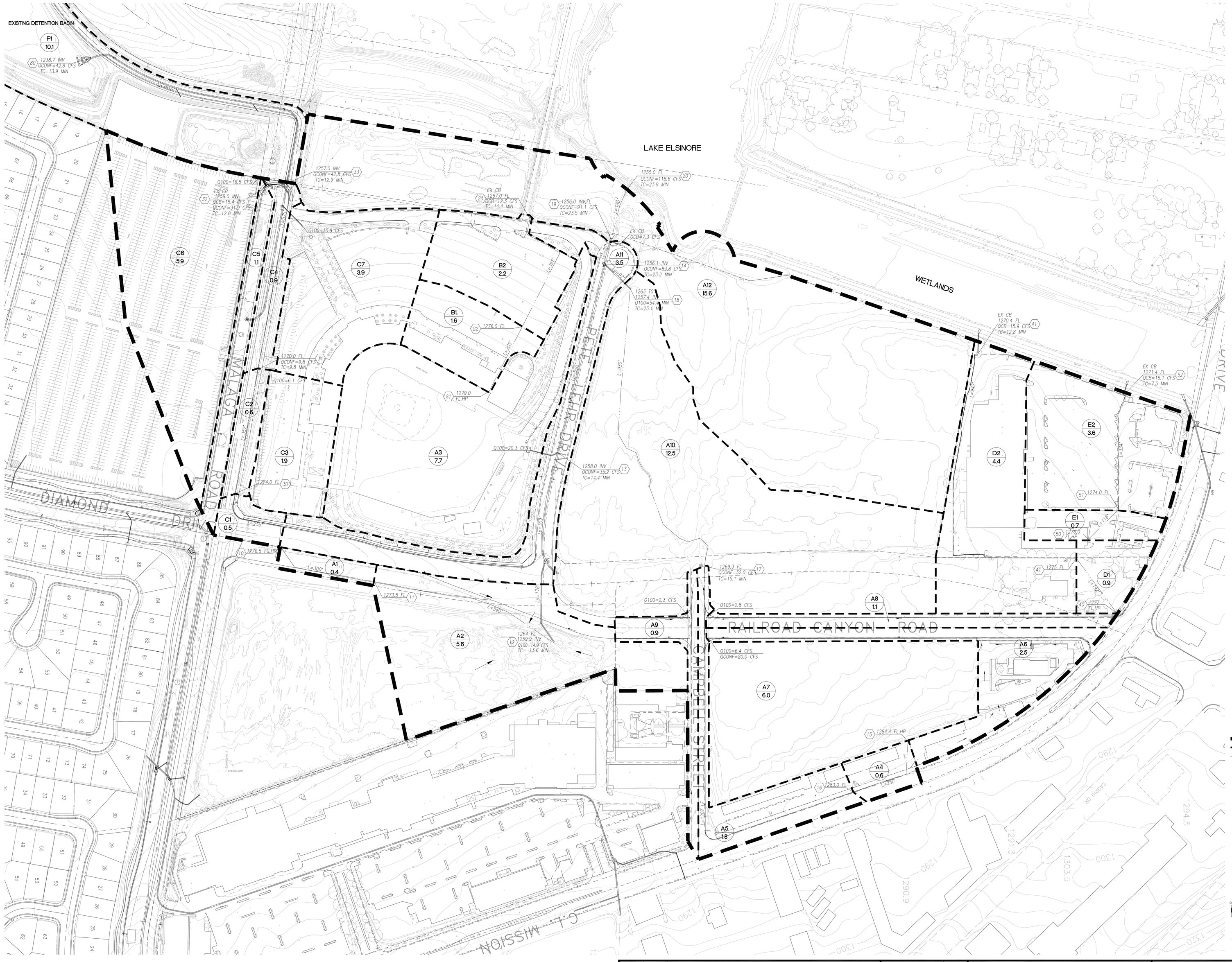
2. CIVILDESIGN, Bonadiman and Associates, 1998.

PROJECT LOCATION MAP

FIGURE 1

S:\10003.10\drainage\LocationMap.doc

APPENDIX A: EXISTING 100-YEAR HYDROLOGY CALCULATIONS



SUMMARY TABLE

	Q100 (CFS) AT OUTLET	TRIBUTARY AREA (ACRES)
SUB-AREA A	118.6 CFS	58.2 AC
SUB-AREA B	12.3 CFS	3.8 AC
SUB-AREA C	42.8 CFS	14.8 AC
SUB-AREA D	15.9 CFS	5.3 AC
SUB-AREA E	16.1 CFS	4.3 AC
TOTAL	205.7 CFS	86.4 AC

LEGEND

- WATERSHED BOUNDARY
- SUB-AREA BOUNDARY
- FLOWLINE AND DIRECTION OF FLOW
- A5 / 0.3 — SUBAREA LABEL / AREA (ACRES)
- 20 — NODE NUMBER

Q10	10-YEAR PEAK FLOW IN CFS
Q100	100-YEAR PEAK FLOW IN CFS
WS 100	100-YEAR PEAK FLOW WATER SURFACE ELEVATION
QCONF	100-YEAR CONFLUENCE PEAK FLOW IN CFS
TC	TIME OF CONCENTRATION (100-YEAR STORM) IN MIN
MIN	MINUTES
CFS	CUBIC FEET PER SECOND
EG	EXISTING GRADE ELEVATION
FG	FINISH GRADE ELEVATION
FS	FINISH SURFACE ELEVATION
INV.	INVERT OF PIPE
L=870'	LENGTH OF FLOWPATH IN FEET

GRAPHIC SCALE

100' 0 50' 100' 200' 400'

(IN FEET)
1 inch = 100' ft.

SCALE: 1"= 100'

NO.	DATE	REVISIONS

DESIGNED BY:
DRAFTED BY:
CHECKED BY:
DATE:

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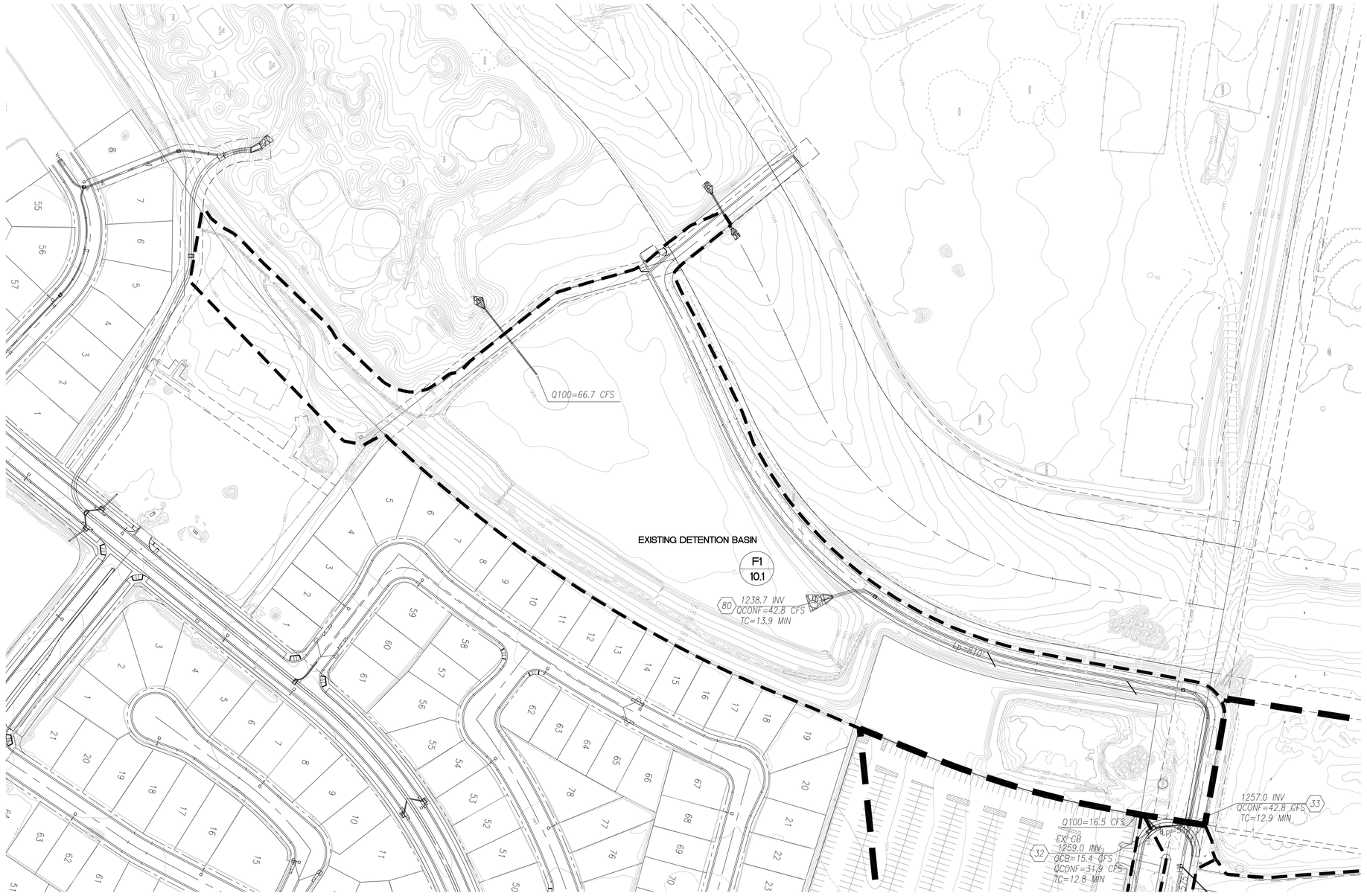
DIAMOND CENTER
EXISTING HYDROLOGY

PROJECT NO. 10088.00

SHEET 1 OF 2



SUMMARY TABLE

	Q100 (CFS) AT OUTLET	TRIBUTARY AREA (ACRES)
SUB-AREA F	66.7 CFS	24.9 AC

LEGEND

- WATERSHED BOUNDARY
- SUB-AREA BOUNDARY
- FLOWLINE AND DIRECTION OF FLOW
- A5 / 0.3 — SUBAREA LABEL / AREA (ACRES)
- (20) — NODE NUMBER

Q10	10-YEAR PEAK FLOW IN CFS
Q100	100-YEAR PEAK FLOW IN CFS
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DIAMOND CENTER
EXISTING HYDROLOGY

PROJECT NO. 10088.00

SHEET 2 OF 2

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******************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
          RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                        (RCFC&WCD)  1978 HYDROLOGY MANUAL
           (c) Copyright 1982-2007 Advanced Engineering Software (aes)
                        (Rational Tabling Version 7.0D)
                   Release Date: 06/01/2007  License ID 1557

                            Analysis prepared by:
```

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 ************************** DESCRIPTION OF STUDY **************************
* EXISTING HYDROLOGY ANALYSIS FOR DIAMOND CENTER                          *
* 100-YEAR RUN                                                            *
* BY KAM 030409                                                           *
 *************************************************************************

  FILE NAME: DIAM-EX.DAT
  TIME/DATE OF STUDY: 09:54 03/11/2009
-----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
-----------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.320
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.980
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  3.540
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.500
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4809628
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4792280
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.500
  SLOPE OF INTENSITY DURATION CURVE = 0.4792
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  ========  ==================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

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

```
 FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21     A1
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  UPSTREAM ELEVATION(FEET) =   1276.00
  DOWNSTREAM ELEVATION(FEET) =   1273.50
  ELEVATION DIFFERENCE(FEET) =      2.50
  TC = 0.303*[(  300.00**3)/(     2.50)]**.2 =    7.732
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.004
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8910
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =      1.43
  TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS) =      1.43

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  51    A2
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1273.50  DOWNSTREAM(FEET) =   1264.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   540.00   CHANNEL SLOPE =  0.0176
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.990
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.058
  UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .7858
  SOIL CLASSIFICATION IS "D"
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.27
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.54
  AVERAGE FLOW DEPTH(FEET) =   0.23   TRAVEL TIME(MIN.) =   5.84
  Tc(MIN.) =   13.58
  SUBAREA AREA(ACRES) =     5.60       SUBAREA RUNOFF(CFS) =   13.45
  TOTAL AREA(ACRES) =        6.0         PEAK FLOW RATE(CFS) =      14.88

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.29   FLOW VELOCITY(FEET/SEC.) =   1.81
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =     840.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1259.90  DOWNSTREAM(FEET) =  1258.00
  FLOW LENGTH(FEET) =   309.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.19
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.88
  PIPE TRAVEL TIME(MIN.) =   0.83    Tc(MIN.) =   14.41
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =    1149.00 FEET.
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81    A3
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.972
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8883
 SOIL CLASSIFICATION IS "D"
 SUBAREA AREA(ACRES) =    7.70   SUBAREA RUNOFF(CFS) =   20.33
 TOTAL AREA(ACRES) =       13.7   TOTAL RUNOFF(CFS) =      35.21
 TC(MIN.) =   14.41

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1258.00  DOWNSTREAM(FEET) =  1256.10
 FLOW LENGTH(FEET) =   550.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  27.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.13
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      35.21
 PIPE TRAVEL TIME(MIN.) =   1.49    Tc(MIN.) =   15.90
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     14.00 =    1699.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   15.90
 RAINFALL INTENSITY(INCH/HR) =   2.83
 TOTAL STREAM AREA(ACRES) =    13.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     35.21

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  21    A4
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
        ASSUMED INITIAL SUBAREA UNIFORM
        DEVELOPMENT IS COMMERCIAL
 TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   250.00
 UPSTREAM ELEVATION(FEET) =   1284.40
 DOWNSTREAM ELEVATION(FEET) =   1283.00
 ELEVATION DIFFERENCE(FEET) =      1.40
 TC = 0.303*[(  250.00**3)/(     1.40)]**.2 =    7.783
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.992
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8910
 SOIL CLASSIFICATION IS "D"
 SUBAREA RUNOFF(CFS) =      2.13
 TOTAL AREA(ACRES) =      0.60   TOTAL RUNOFF(CFS) =      2.13
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  61     A5
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1283.00  DOWNSTREAM ELEVATION(FEET) = 1269.30
 STREET LENGTH(FEET) =  1207.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.47
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.40
   HALFSTREET FLOOD WIDTH(FEET) =   12.02
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.74
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.09
 STREET FLOW TRAVEL TIME(MIN.) =   7.35   Tc(MIN.) =   15.13
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.903
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8880
 SOIL CLASSIFICATION IS "D"
 SUBAREA AREA(ACRES) =    1.80      SUBAREA RUNOFF(CFS) =    4.64
 TOTAL AREA(ACRES) =        2.4        PEAK FLOW RATE(CFS) =       6.77

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.45   HALFSTREET FLOOD WIDTH(FEET) =  14.34
 FLOW VELOCITY(FEET/SEC.) =  3.02   DEPTH*VELOCITY(FT*FT/SEC.) =   1.34
 LONGEST FLOWPATH FROM NODE     15.00 TO NODE     17.00 =    1457.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81     A6
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.903
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8880
 SOIL CLASSIFICATION IS "D"
 SUBAREA AREA(ACRES) =    2.50   SUBAREA RUNOFF(CFS) =    6.44
 TOTAL AREA(ACRES) =        4.9   TOTAL RUNOFF(CFS) =      13.22
 TC(MIN.) =   15.13

****************************************************************************
 FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81     A7
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.903
 UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .7805
 SOIL CLASSIFICATION IS "D"
 SUBAREA AREA(ACRES) =    6.00   SUBAREA RUNOFF(CFS) =   13.59
```

```
 TOTAL AREA(ACRES) =      10.9   TOTAL RUNOFF(CFS) =      26.81
 TC(MIN.) =   15.13

****************************************************************************
 FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81     A8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.903
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8880
 SOIL CLASSIFICATION IS "D"
 SUBAREA AREA(ACRES) =    1.10   SUBAREA RUNOFF(CFS) =    2.84
 TOTAL AREA(ACRES) =      12.0   TOTAL RUNOFF(CFS) =      29.65
 TC(MIN.) =   15.13

****************************************************************************
 FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  81     A9
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.903
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8880
 SOIL CLASSIFICATION IS "D"
 SUBAREA AREA(ACRES) =    0.90   SUBAREA RUNOFF(CFS) =    2.32
 TOTAL AREA(ACRES) =      12.9   TOTAL RUNOFF(CFS) =      31.97
 TC(MIN.) =   15.13

****************************************************************************
 FLOW PROCESS FROM NODE     17.00 TO NODE     18.00 IS CODE =  51     A10
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1269.30  DOWNSTREAM(FEET) =   1263.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   930.00   CHANNEL SLOPE =  0.0068
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  50.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   1.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.370
 UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .7579
 SOIL CLASSIFICATION IS "D"
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      43.25
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.95
 AVERAGE FLOW DEPTH(FEET) =   0.67   TRAVEL TIME(MIN.) =   7.96
 Tc(MIN.) =   23.09
 SUBAREA AREA(ACRES) =    12.50       SUBAREA RUNOFF(CFS) =   22.46
 TOTAL AREA(ACRES) =      25.4          PEAK FLOW RATE(CFS) =      54.42

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.72   FLOW VELOCITY(FEET/SEC.) =   2.09
 LONGEST FLOWPATH FROM NODE     15.00 TO NODE     18.00 =    2387.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     18.00 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
 ELEVATION DATA: UPSTREAM(FEET) =  1257.40  DOWNSTREAM(FEET) =  1256.10
 FLOW LENGTH(FEET) =    97.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  24.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.39
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      54.42
 PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   23.24
 LONGEST FLOWPATH FROM NODE     15.00 TO NODE     14.00 =    2484.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   23.24
 RAINFALL INTENSITY(INCH/HR) =   2.36
 TOTAL STREAM AREA(ACRES) =    25.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     54.42

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
    1       35.21    15.90        2.834         13.70
    2       54.42    23.24        2.363         25.40

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

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
    1       72.45    15.90       2.834
    2       83.78    23.24       2.363

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      83.78   Tc(MIN.) =   23.24
 TOTAL AREA(ACRES) =       39.1
 LONGEST FLOWPATH FROM NODE     15.00 TO NODE     14.00 =    2484.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     19.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1256.10  DOWNSTREAM(FEET) =  1256.00
 FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  43.4 INCHES
```

```
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.51
 ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      83.78
 PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   23.45
 LONGEST FLOWPATH FROM NODE     15.00 TO NODE     19.00 =    2554.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81    A11
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.353
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8857
 SOIL CLASSIFICATION IS "D"
 SUBAREA AREA(ACRES) =    3.50   SUBAREA RUNOFF(CFS) =    7.29
 TOTAL AREA(ACRES) =       42.6   TOTAL RUNOFF(CFS) =      91.07
 TC(MIN.) =   23.45

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     20.00 IS CODE =  51    A12
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1256.00  DOWNSTREAM(FEET) =   1255.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   130.00   CHANNEL SLOPE =  0.0077
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =   5.000
 MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00

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

  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.333
 UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .7560
 SOIL CLASSIFICATION IS "D"
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     104.84
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.24
 AVERAGE FLOW DEPTH(FEET) =   2.00   TRAVEL TIME(MIN.) =   0.41
 Tc(MIN.) =   23.86
 SUBAREA AREA(ACRES) =    15.60       SUBAREA RUNOFF(CFS) =   27.52
 TOTAL AREA(ACRES) =       58.2         PEAK FLOW RATE(CFS) =     118.59

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


 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  2.00   FLOW VELOCITY(FEET/SEC.) =   5.93

 ==>FLOWDEPTH EXCEEDS MAXIMUM ALLOWABLE DEPTH
```

```
 LONGEST FLOWPATH FROM NODE     15.00 TO NODE     20.00 =    2684.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  21     B1
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
        ASSUMED INITIAL SUBAREA UNIFORM
        DEVELOPMENT IS COMMERCIAL
 TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   205.00
 UPSTREAM ELEVATION(FEET) =   1279.00
 DOWNSTREAM ELEVATION(FEET) =   1276.00
 ELEVATION DIFFERENCE(FEET) =      3.00
 TC = 0.303*[(  205.00**3)/(     3.00)]**.2 =    5.932
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.547
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8920
 SOIL CLASSIFICATION IS "D"
 SUBAREA RUNOFF(CFS) =      6.49
 TOTAL AREA(ACRES) =      1.60   TOTAL RUNOFF(CFS) =      6.49

****************************************************************************
 FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  51     B2
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1276.00  DOWNSTREAM(FEET) =   1267.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   391.00   CHANNEL SLOPE =  0.0230
 CHANNEL BASE(FEET) = 1000.00   "Z" FACTOR =  99.900
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   1.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.968
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8883
 SOIL CLASSIFICATION IS "D"
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.51
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.77
 AVERAGE FLOW DEPTH(FEET) =   0.01   TRAVEL TIME(MIN.) =   8.51
 Tc(MIN.) =   14.44
 SUBAREA AREA(ACRES) =     2.20       SUBAREA RUNOFF(CFS) =    5.80
 TOTAL AREA(ACRES) =       3.8        PEAK FLOW RATE(CFS) =      12.29

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.01   FLOW VELOCITY(FEET/SEC.) =   0.99
 LONGEST FLOWPATH FROM NODE     21.00 TO NODE     23.00 =     596.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     30.00 IS CODE =  21     C1
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
        ASSUMED INITIAL SUBAREA UNIFORM
        DEVELOPMENT IS COMMERCIAL
 TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   255.00
 UPSTREAM ELEVATION(FEET) =   1276.00
 DOWNSTREAM ELEVATION(FEET) =   1274.00
 ELEVATION DIFFERENCE(FEET) =      2.00
```

```
 TC = 0.303*[(  255.00**3)/(     2.00)]**.2 =    7.333
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.107
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8912
 SOIL CLASSIFICATION IS "D"
 SUBAREA RUNOFF(CFS) =      1.83
 TOTAL AREA(ACRES) =      0.50   TOTAL RUNOFF(CFS) =      1.83

****************************************************************************
 FLOW PROCESS FROM NODE     30.00 TO NODE     31.00 IS CODE =  61     C2
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1274.00  DOWNSTREAM ELEVATION(FEET) = 1270.00
 STREET LENGTH(FEET) =   357.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 40.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  35.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.79
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.35
   HALFSTREET FLOOD WIDTH(FEET) =    9.76
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.44
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.86
 STREET FLOW TRAVEL TIME(MIN.) =   2.44   Tc(MIN.) =    9.77
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.580
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8901
 SOIL CLASSIFICATION IS "D"
 SUBAREA AREA(ACRES) =    0.60      SUBAREA RUNOFF(CFS) =    1.91
 TOTAL AREA(ACRES) =        1.1        PEAK FLOW RATE(CFS) =       3.74

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  11.17
 FLOW VELOCITY(FEET/SEC.) =  2.61   DEPTH*VELOCITY(FT*FT/SEC.) =   0.99
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     31.00 =     612.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     31.00 TO NODE     31.00 IS CODE =  81   C3
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.580
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8901
 SOIL CLASSIFICATION IS "D"
 SUBAREA AREA(ACRES) =    1.90   SUBAREA RUNOFF(CFS) =    6.05
 TOTAL AREA(ACRES) =        3.0   TOTAL RUNOFF(CFS) =       9.80
 TC(MIN.) =    9.77

****************************************************************************
 FLOW PROCESS FROM NODE     31.00 TO NODE     32.00 IS CODE =  61    C4
----------------------------------------------------------------------------
```

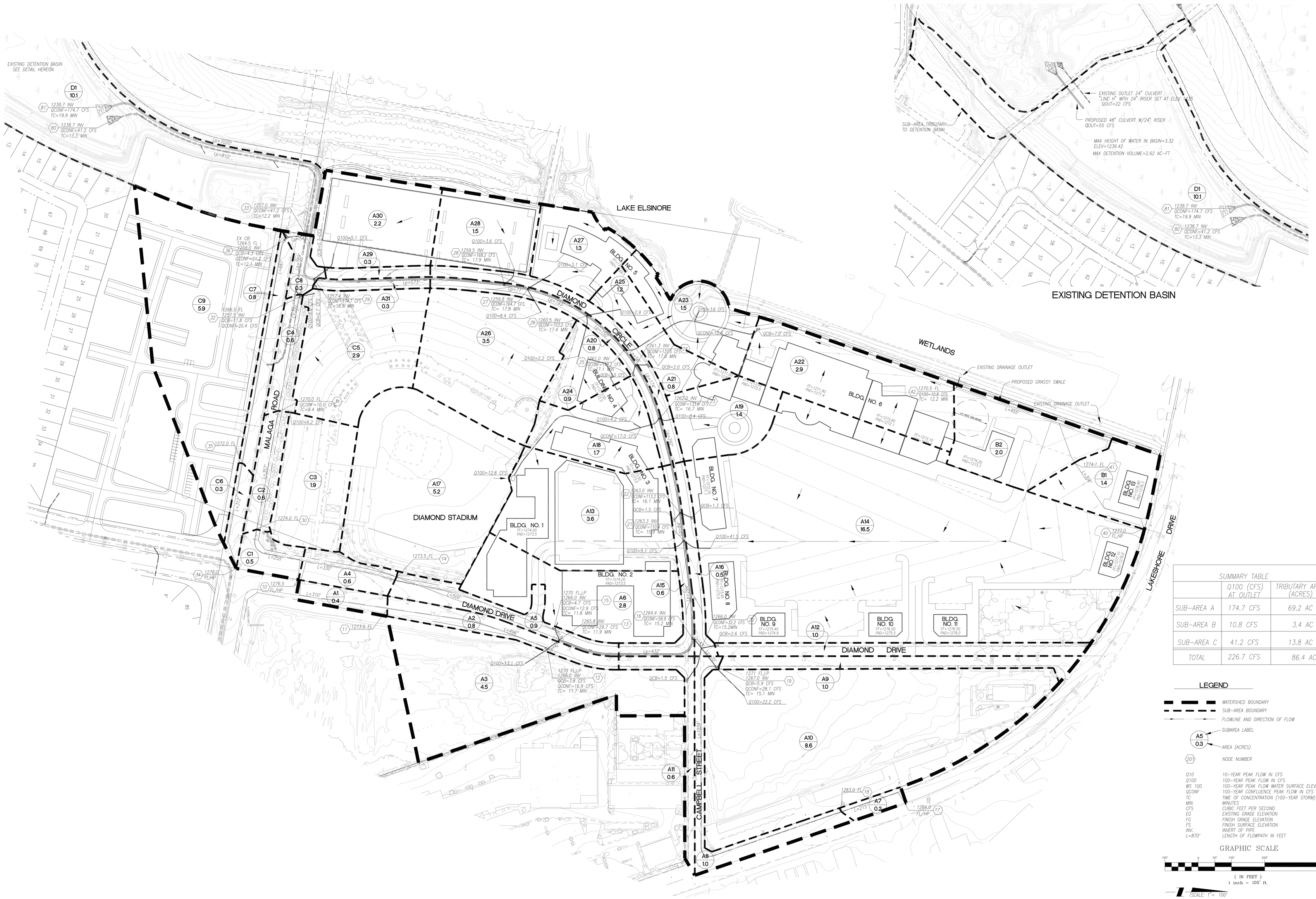
```
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1270.00  DOWNSTREAM ELEVATION(FEET) = 1264.50
  STREET LENGTH(FEET) =   575.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.05
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.52
    HALFSTREET FLOOD WIDTH(FEET) =   18.21
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.15
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.65
  STREET FLOW TRAVEL TIME(MIN.) =   3.04   Tc(MIN.) =   12.81
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.144
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8889
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    0.90      SUBAREA RUNOFF(CFS) =    2.52
  TOTAL AREA(ACRES) =        3.9        PEAK FLOW RATE(CFS) =      12.31

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.54   HALFSTREET FLOOD WIDTH(FEET) =  18.98
  FLOW VELOCITY(FEET/SEC.) =  3.25   DEPTH*VELOCITY(FT*FT/SEC.) =   1.75
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     32.00 =    1187.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     32.00 IS CODE =  81     C5
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.144
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8889
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    1.10   SUBAREA RUNOFF(CFS) =    3.07
  TOTAL AREA(ACRES) =        5.0   TOTAL RUNOFF(CFS) =      15.39
  TC(MIN.) =   12.81

****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     32.00 IS CODE =  81     C6
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.144
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8889
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    5.90   SUBAREA RUNOFF(CFS) =   16.49
  TOTAL AREA(ACRES) =       10.9   TOTAL RUNOFF(CFS) =      31.87
  TC(MIN.) =   12.81

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

```
 FLOW PROCESS FROM NODE     32.00 TO NODE     33.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1259.00  DOWNSTREAM(FEET) =  1257.00
 FLOW LENGTH(FEET) =    54.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  14.83
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      31.87
 PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   12.87
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     33.00 =    1241.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  81    C7
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.137
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8888
 SOIL CLASSIFICATION IS "D"
 SUBAREA AREA(ACRES) =    3.90   SUBAREA RUNOFF(CFS) =   10.87
 TOTAL AREA(ACRES) =      14.8   TOTAL RUNOFF(CFS) =     42.75
 TC(MIN.) =   12.87

****************************************************************************
 FLOW PROCESS FROM NODE     33.00 TO NODE     80.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1257.00  DOWNSTREAM(FEET) =  1238.70
 FLOW LENGTH(FEET) =   810.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.98
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      42.75
 PIPE TRAVEL TIME(MIN.) =   1.04    Tc(MIN.) =   13.91
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     80.00 =    2051.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     80.00 TO NODE     80.00 IS CODE =  81    F1
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.022
 UNDEVELOPED WATERSHED RUNOFF COEFFICIENT = .7846
 SOIL CLASSIFICATION IS "D"
 SUBAREA AREA(ACRES) =   10.10   SUBAREA RUNOFF(CFS) =   23.95
 TOTAL AREA(ACRES) =      24.9   TOTAL RUNOFF(CFS) =     66.70
 TC(MIN.) =   13.91

****************************************************************************
 FLOW PROCESS FROM NODE     40.00 TO NODE     41.00 IS CODE =  21    D1
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
==========================================================================
        ASSUMED INITIAL SUBAREA UNIFORM
        DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   192.00
  UPSTREAM ELEVATION(FEET) =   1277.00
  DOWNSTREAM ELEVATION(FEET) =   1275.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  TC = 0.303*[(  192.00**3)/(     2.00)]**.2 =    6.185
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.456
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8918
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =      3.58
  TOTAL AREA(ACRES) =      0.90   TOTAL RUNOFF(CFS) =      3.58

**************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     42.00 IS CODE =  61    D2
--------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) = 1275.00  DOWNSTREAM ELEVATION(FEET) = 1270.40
  STREET LENGTH(FEET) =   942.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.73
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
         NOTE: STREET FLOW EXCEEDS TOP OF CURB.
         THE FOLLOWING STREET FLOW RESULTS ARE BASED ON THE ASSUMPTION
         THAT NEGLIBLE FLOW OCCURS OUTSIDE OF THE STREET CHANNEL.
         THAT IS, ALL FLOW ALONG THE PARKWAY, ETC., IS NEGLECTED.
    STREET FLOW DEPTH(FEET) =  0.53
    HALFSTREET FLOOD WIDTH(FEET) =   19.96
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.37
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.25
  STREET FLOW TRAVEL TIME(MIN.) =   6.62   Tc(MIN.) =   12.81
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.144
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8889
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    4.40      SUBAREA RUNOFF(CFS) =   12.30
  TOTAL AREA(ACRES) =       5.3        PEAK FLOW RATE(CFS) =      15.87

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.53   HALFSTREET FLOOD WIDTH(FEET) =  20.00
  FLOW VELOCITY(FEET/SEC.) =  2.37   DEPTH*VELOCITY(FT*FT/SEC.) =   1.25
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L =  942.0 FT WITH ELEVATION-DROP =   4.6 FT, IS   11.9 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE     42.00
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     42.00 =    1134.00 FEET.
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     50.00 TO NODE     51.00 IS CODE =  21      E1
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
        ASSUMED INITIAL SUBAREA UNIFORM
        DEVELOPMENT IS COMMERCIAL
 TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   116.00
 UPSTREAM ELEVATION(FEET) =   1276.00
 DOWNSTREAM ELEVATION(FEET) =   1274.00
 ELEVATION DIFFERENCE(FEET) =      2.00
 TC = 0.303*[(  116.00**3)/(     2.00)]**.2 =    4.571
 COMPUTED TIME OF CONCENTRATION INCREASED TO 5 MIN.
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.935
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8926
 SOIL CLASSIFICATION IS "D"
 SUBAREA RUNOFF(CFS) =      3.08
 TOTAL AREA(ACRES) =      0.70   TOTAL RUNOFF(CFS) =      3.08

****************************************************************************
 FLOW PROCESS FROM NODE     51.00 TO NODE     52.00 IS CODE =  91      E2
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =   1274.00
 DOWNSTREAM NODE ELEVATION(FEET) =   1271.40
 CHANNEL LENGTH THRU SUBAREA(FEET) =   334.00
 "V" GUTTER WIDTH(FEET) =   3.00   GUTTER HIKE(FEET) =  0.170
 PAVEMENT LIP(FEET) =  0.040   MANNING'S N = .0150
 PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.01000
 MAXIMUM DEPTH(FEET) =   1.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.062
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8911
 SOIL CLASSIFICATION IS "D"
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      9.62
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.22
 AVERAGE FLOW DEPTH(FEET) =   0.39   FLOOD WIDTH(FEET) =   39.88
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =   2.50   Tc(MIN.) =    7.50
 SUBAREA AREA(ACRES) =    3.60       SUBAREA RUNOFF(CFS) =   13.03
 TOTAL AREA(ACRES) =       4.3          PEAK FLOW RATE(CFS) =      16.12

 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =  0.44   FLOOD WIDTH(FEET) =   49.75
 FLOW VELOCITY(FEET/SEC.) =   2.46   DEPTH*VELOCITY(FT*FT/SEC) =   1.09
 LONGEST FLOWPATH FROM NODE     50.00 TO NODE     52.00 =     450.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =        4.3  TC(MIN.) =      7.50
 PEAK FLOW RATE(CFS)    =      16.12
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

APPENDIX B: PROPOSED 100-YEAR HYDROLOGY CALCULATIONS



SUMMARY TABLE		
	Q100 (CFS) AT OUTLET	TRIBUTARY AREA (ACRES)
SUB-AREA A	174.7 CFS	69.2 AC
SUB-AREA B	10.8 CFS	3.4 AC
SUB-AREA C	41.2 CFS	13.8 AC
TOTAL	226.7 CFS	86.4 AC

LEGEND

- WATERSHED BOUNDARY
- SUB-AREA BOUNDARY
- FLOWLINE AND DIRECTION OF FLOW
- A5 / 0.3 — SUBAREA LABEL / AREA (ACRES)
- (20) — NODE NUMBER

Q10	10-YEAR PEAK FLOW IN CFS
Q100	100-YEAR PEAK FLOW IN CFS
WS 100	100-YEAR PEAK FLOW WATER SURFACE ELEVATION
QCONF	100-YEAR CONFLUENCE PEAK FLOW IN CFS
TC	TIME OF CONCENTRATION (100-YEAR STORM) IN MIN
MIN	MINUTES
CFS	CUBIC FEET PER SECOND
EG	EXISTING GRADE ELEVATION
FG	FINISH GRADE ELEVATION
FS	FINISH SURFACE ELEVATION
INV.	INVERT OF PIPE
L=870'	LENGTH OF FLOWPATH IN FEET

GRAPHIC SCALE

100' 0 50' 100' 200' 400'

(IN FEET)
1 inch = 100' ft.

SCALE: 1" = 100'

NO.	DATE	REVISIONS	DESIGNED BY:	DRAFTED BY:	CHECKED BY:	DATE:

WILSON MIKAMI CORPORATION
3 PETERS CANYON, SUITE 110
IRVINE, CA 92606
T: 949-679-0090

DIAMOND CENTER
PROPOSED HYDROLOGY

PROJECT NO. 10088.00

SHEET 1 OF 1

```
**************************************************************************
          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM BASED ON
        RIVERSIDE COUNTY FLOOD CONTROL & WATER CONSERVATION DISTRICT
                    (RCFC&WCD)  1978 HYDROLOGY MANUAL
         (c) Copyright 1982-2007 Advanced Engineering Software (aes)
                    (Rational Tabling Version 7.0D)
                Release Date: 06/01/2007  License ID 1557

                        Analysis prepared by:
```

```
 ************************** DESCRIPTION OF STUDY **************************
* PROPOSED HYDROLOGY ANALYSIS FOR DIAMOND CENTER                          *
* 100-YEAR RUN                                                            *
* BY KAM 022609                                                           *
 *************************************************************************

  FILE NAME: DIAMOND.DAT
  TIME/DATE OF STUDY: 12:21 03/11/2009
-------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
-------------------------------------------------------------------------
  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  10-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  2.320
  10-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  0.980
  100-YEAR STORM 10-MINUTE INTENSITY(INCH/HOUR) =  3.540
  100-YEAR STORM 60-MINUTE INTENSITY(INCH/HOUR) =  1.500
  SLOPE OF 10-YEAR INTENSITY-DURATION CURVE =  0.4809628
  SLOPE OF 100-YEAR INTENSITY-DURATION CURVE =  0.4792280
  COMPUTED RAINFALL INTENSITY DATA:
  STORM EVENT =  100.00   1-HOUR INTENSITY(INCH/HOUR) =   1.500
  SLOPE OF INTENSITY DURATION CURVE = 0.4792
  RCFC&WCD HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: COMPUTE CONFLUENCE VALUES ACCORDING TO RCFC&WCD HYDROLOGY MANUAL
        AND IGNORE OTHER CONFLUENCE COMBINATIONS FOR DOWNSTREAM ANALYSES
  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

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

```
 FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21      A1
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   310.00
  UPSTREAM ELEVATION(FEET) =   1276.50
  DOWNSTREAM ELEVATION(FEET) =   1273.50
  ELEVATION DIFFERENCE(FEET) =      3.00
  TC = 0.303*[(  310.00**3)/(     3.00)]**.2 =    7.603
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.037
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8911
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =      1.44
  TOTAL AREA(ACRES) =      0.40   TOTAL RUNOFF(CFS) =      1.44

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  61      A2
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1273.50  DOWNSTREAM ELEVATION(FEET) = 1270.00
  STREET LENGTH(FEET) =   496.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  25.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.61
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =   10.56
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.00
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.74
  STREET FLOW TRAVEL TIME(MIN.) =   4.13   Tc(MIN.) =   11.73
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.279
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8893
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    2.33
  TOTAL AREA(ACRES) =       1.2        PEAK FLOW RATE(CFS) =       3.77

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  12.42
  FLOW VELOCITY(FEET/SEC.) =  2.18   DEPTH*VELOCITY(FT*FT/SEC.) =   0.89
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =     806.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81      A3
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
================================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.279
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8893
SOIL CLASSIFICATION IS "D"
SUBAREA AREA(ACRES) =    4.50   SUBAREA RUNOFF(CFS) =   13.12
TOTAL AREA(ACRES) =       5.7   TOTAL RUNOFF(CFS) =      16.89
TC(MIN.) =   11.73

****************************************************************************
FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =  1266.00  DOWNSTREAM(FEET) =  1265.80
FLOW LENGTH(FEET) =    42.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.5 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   5.83
ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =      16.89
PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   11.85
LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =     848.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 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.) =   11.85
RAINFALL INTENSITY(INCH/HR) =   3.26
TOTAL STREAM AREA(ACRES) =     5.70
PEAK FLOW RATE(CFS) AT CONFLUENCE =     16.89

****************************************************************************
FLOW PROCESS FROM NODE     10.00 TO NODE     14.00 IS CODE =  21     A4
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
INITIAL SUBAREA FLOW-LENGTH(FEET) =   330.00
UPSTREAM ELEVATION(FEET) =   1276.50
DOWNSTREAM ELEVATION(FEET) =   1273.50
ELEVATION DIFFERENCE(FEET) =      3.00
TC = 0.303*[(  330.00**3)/(     3.00)]**.2 =    7.894
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.965
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8909
SOIL CLASSIFICATION IS "D"
SUBAREA RUNOFF(CFS) =      2.12
TOTAL AREA(ACRES) =      0.60   TOTAL RUNOFF(CFS) =      2.12

****************************************************************************
FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  61     A5
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1273.50  DOWNSTREAM ELEVATION(FEET) = 1270.00
  STREET LENGTH(FEET) =   500.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  25.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.43
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   11.93
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.13
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.84
  STREET FLOW TRAVEL TIME(MIN.) =   3.91   Tc(MIN.) =   11.81
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.269
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8892
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    0.90      SUBAREA RUNOFF(CFS) =    2.62
  TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       4.74

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  13.68
  FLOW VELOCITY(FEET/SEC.) =  2.30   DEPTH*VELOCITY(FT*FT/SEC.) =   0.99
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     15.00 =     830.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81     A6
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.269
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8892
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    2.80   SUBAREA RUNOFF(CFS) =    8.14
  TOTAL AREA(ACRES) =        4.3   TOTAL RUNOFF(CFS) =      12.88
  TC(MIN.) =   11.81

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1266.00  DOWNSTREAM(FEET) =  1265.80
  FLOW LENGTH(FEET) =    34.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.92
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.88
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   11.90
```

```
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =     864.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 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.) =   11.90
 RAINFALL INTENSITY(INCH/HR) =   3.26
 TOTAL STREAM AREA(ACRES) =     4.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     12.88

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
    1       16.89    11.85        3.263          5.70
    2       12.88    11.90        3.257          4.30

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

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
    1       29.71    11.85       3.263
    2       29.73    11.90       3.257

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      29.71   Tc(MIN.) =   11.85
 TOTAL AREA(ACRES) =       10.0
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =     864.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1265.80  DOWNSTREAM(FEET) =  1264.40
 FLOW LENGTH(FEET) =   432.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.82
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      29.71
 PIPE TRAVEL TIME(MIN.) =   1.24    Tc(MIN.) =   13.09
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     16.00 =    1296.00 FEET.

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

```
 FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 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.) =   13.09
 RAINFALL INTENSITY(INCH/HR) =   3.11
 TOTAL STREAM AREA(ACRES) =    10.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     29.71

****************************************************************************
 FLOW PROCESS FROM NODE     17.00 TO NODE     18.00 IS CODE =  21     A7
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
        ASSUMED INITIAL SUBAREA UNIFORM
        DEVELOPMENT IS COMMERCIAL
 TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   215.00
 UPSTREAM ELEVATION(FEET) =   1284.00
 DOWNSTREAM ELEVATION(FEET) =   1283.00
 ELEVATION DIFFERENCE(FEET) =      1.00
 TC = 0.303*[(  215.00**3)/(     1.00)]**.2 =    7.604
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.037
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8911
 SOIL CLASSIFICATION IS "D"
 SUBAREA RUNOFF(CFS) =      0.72
 TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.72

****************************************************************************
 FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  61     A8
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) = 1283.00  DOWNSTREAM ELEVATION(FEET) = 1271.00
 STREET LENGTH(FEET) =  1034.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  15.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.03
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.32
   HALFSTREET FLOOD WIDTH(FEET) =    8.29
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.31
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.75
 STREET FLOW TRAVEL TIME(MIN.) =   7.46   Tc(MIN.) =   15.06
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.909
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8881
 SOIL CLASSIFICATION IS "D"
```

```
 SUBAREA AREA(ACRES) =     1.00      SUBAREA RUNOFF(CFS) =     2.58
 TOTAL AREA(ACRES) =        1.2        PEAK FLOW RATE(CFS) =       3.30

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  10.47
 FLOW VELOCITY(FEET/SEC.) =  2.57   DEPTH*VELOCITY(FT*FT/SEC.) =   0.94
 LONGEST FLOWPATH FROM NODE     17.00 TO NODE     19.00 =    1249.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81     A9
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.909
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8881
 SOIL CLASSIFICATION IS "D"
 SUBAREA AREA(ACRES) =     1.00   SUBAREA RUNOFF(CFS) =     2.58
 TOTAL AREA(ACRES) =        2.2   TOTAL RUNOFF(CFS) =       5.89
 TC(MIN.) =   15.06

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 IS CODE =  81    A10
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.909
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8881
 SOIL CLASSIFICATION IS "D"
 SUBAREA AREA(ACRES) =     8.60   SUBAREA RUNOFF(CFS) =    22.22
 TOTAL AREA(ACRES) =       10.8   TOTAL RUNOFF(CFS) =      28.10
 TC(MIN.) =   15.06

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     20.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1267.00  DOWNSTREAM(FEET) =  1266.00
 FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.03
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      28.10
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   15.18
 LONGEST FLOWPATH FROM NODE     17.00 TO NODE     20.00 =    1319.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  81    A11
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.898
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8880
 SOIL CLASSIFICATION IS "D"
 SUBAREA AREA(ACRES) =     0.60   SUBAREA RUNOFF(CFS) =     1.54
 TOTAL AREA(ACRES) =       11.4   TOTAL RUNOFF(CFS) =      29.65
```

```
 TC(MIN.) =   15.18

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 IS CODE =  81      A12
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.898
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8880
 SOIL CLASSIFICATION IS "D"
 SUBAREA AREA(ACRES) =    1.00   SUBAREA RUNOFF(CFS) =    2.57
 TOTAL AREA(ACRES) =      12.4   TOTAL RUNOFF(CFS) =     32.22
 TC(MIN.) =   15.18

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     16.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1266.00  DOWNSTREAM(FEET) =  1264.40
 FLOW LENGTH(FEET) =    43.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  14.89
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      32.22
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   15.23
 LONGEST FLOWPATH FROM NODE     17.00 TO NODE     16.00 =    1362.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   15.23
 RAINFALL INTENSITY(INCH/HR) =   2.89
 TOTAL STREAM AREA(ACRES) =    12.40
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     32.22

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       29.71    13.09        3.111         10.00
     2       32.22    15.23        2.894         12.40

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

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

```
 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       57.41    13.09       3.111
     2       59.86    15.23       2.894

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      59.86   Tc(MIN.) =   15.23
 TOTAL AREA(ACRES) =       22.4
 LONGEST FLOWPATH FROM NODE     17.00 TO NODE     16.00 =    1362.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     21.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1264.40  DOWNSTREAM(FEET) =  1263.30
 FLOW LENGTH(FEET) =   294.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  34.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.11
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      59.86
 PIPE TRAVEL TIME(MIN.) =   0.69    Tc(MIN.) =   15.92
 LONGEST FLOWPATH FROM NODE     17.00 TO NODE     21.00 =    1656.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81    A13
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.833
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8878
 SOIL CLASSIFICATION IS "D"
 SUBAREA AREA(ACRES) =    3.60   SUBAREA RUNOFF(CFS) =    9.05
 TOTAL AREA(ACRES) =       26.0   TOTAL RUNOFF(CFS) =      68.91
 TC(MIN.) =   15.92

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  81    A14
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.833
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8878
 SOIL CLASSIFICATION IS "D"
 SUBAREA AREA(ACRES) =   16.50   SUBAREA RUNOFF(CFS) =   41.50
 TOTAL AREA(ACRES) =       42.5   TOTAL RUNOFF(CFS) =     110.41
 TC(MIN.) =   15.92

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1263.30  DOWNSTREAM(FEET) =  1263.00
```

```
 FLOW LENGTH(FEET) =    84.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  54.0 INCH PIPE IS  42.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.20
 ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     110.41
 PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   16.09
 LONGEST FLOWPATH FROM NODE     17.00 TO NODE     22.00 =    1740.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81      A15
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.819
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8877
 SOIL CLASSIFICATION IS "D"
 SUBAREA AREA(ACRES) =    0.60   SUBAREA RUNOFF(CFS) =    1.50
 TOTAL AREA(ACRES) =      43.1   TOTAL RUNOFF(CFS) =     111.91
 TC(MIN.) =   16.09

****************************************************************************
 FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81      A16
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.819
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8877
 SOIL CLASSIFICATION IS "D"
 SUBAREA AREA(ACRES) =    0.50   SUBAREA RUNOFF(CFS) =    1.25
 TOTAL AREA(ACRES) =      43.6   TOTAL RUNOFF(CFS) =     113.16
 TC(MIN.) =   16.09

****************************************************************************
 FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1263.00  DOWNSTREAM(FEET) =  1262.00
 FLOW LENGTH(FEET) =   292.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  41.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.24
 ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     113.16
 PIPE TRAVEL TIME(MIN.) =   0.59    Tc(MIN.) =   16.68
 LONGEST FLOWPATH FROM NODE     17.00 TO NODE     23.00 =    2032.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81      A17
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.770
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8876
 SOIL CLASSIFICATION IS "D"
 SUBAREA AREA(ACRES) =    5.20   SUBAREA RUNOFF(CFS) =   12.79
 TOTAL AREA(ACRES) =      48.8   TOTAL RUNOFF(CFS) =     125.95
```

```
 TC(MIN.) =   16.68

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81     A18
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.770
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8876
 SOIL CLASSIFICATION IS "D"
 SUBAREA AREA(ACRES) =    1.70   SUBAREA RUNOFF(CFS) =    4.18
 TOTAL AREA(ACRES) =      50.5   TOTAL RUNOFF(CFS) =    130.13
 TC(MIN.) =   16.68

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81     A19
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.770
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8876
 SOIL CLASSIFICATION IS "D"
 SUBAREA AREA(ACRES) =    1.40   SUBAREA RUNOFF(CFS) =    3.44
 TOTAL AREA(ACRES) =      51.9   TOTAL RUNOFF(CFS) =    133.57
 TC(MIN.) =   16.68

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1262.00  DOWNSTREAM(FEET) =  1261.30
 FLOW LENGTH(FEET) =   174.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  44.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.02
 ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     133.57
 PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   17.00
 LONGEST FLOWPATH FROM NODE     17.00 TO NODE     24.00 =    2206.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81     A20
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.745
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8875
 SOIL CLASSIFICATION IS "D"
 SUBAREA AREA(ACRES) =    0.80   SUBAREA RUNOFF(CFS) =    1.95
 TOTAL AREA(ACRES) =      52.7   TOTAL RUNOFF(CFS) =    135.52
 TC(MIN.) =   17.00

****************************************************************************
 FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81     A21
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
================================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.745
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8875
SOIL CLASSIFICATION IS "D"
SUBAREA AREA(ACRES) =    0.80   SUBAREA RUNOFF(CFS) =    1.95
TOTAL AREA(ACRES) =      53.5   TOTAL RUNOFF(CFS) =    137.47
TC(MIN.) =   17.00

****************************************************************************
FLOW PROCESS FROM NODE     24.00 TO NODE     25.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =  1261.30  DOWNSTREAM(FEET) =  1261.00
FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  54.0 INCH PIPE IS  43.3 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  10.06
ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     137.47
PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   17.09
LONGEST FLOWPATH FROM NODE     17.00 TO NODE     25.00 =    2262.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =  81     A22
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.738
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8874
SOIL CLASSIFICATION IS "D"
SUBAREA AREA(ACRES) =    2.90   SUBAREA RUNOFF(CFS) =    7.05
TOTAL AREA(ACRES) =      56.4   TOTAL RUNOFF(CFS) =    144.51
TC(MIN.) =   17.09

****************************************************************************
FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =  81     A23
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.738
COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8874
SOIL CLASSIFICATION IS "D"
SUBAREA AREA(ACRES) =    1.50   SUBAREA RUNOFF(CFS) =    3.64
TOTAL AREA(ACRES) =      57.9   TOTAL RUNOFF(CFS) =    148.16
TC(MIN.) =   17.09

****************************************************************************
FLOW PROCESS FROM NODE     25.00 TO NODE     26.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =  1261.00  DOWNSTREAM(FEET) =  1260.50
FLOW LENGTH(FEET) =   150.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  63.0 INCH PIPE IS  46.2 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =   8.71
```

```
  ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     148.16
  PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =   17.38
  LONGEST FLOWPATH FROM NODE     17.00 TO NODE     26.00 =    2412.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     26.00 IS CODE =  81      A24
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.716
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8873
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    0.90   SUBAREA RUNOFF(CFS) =    2.17
  TOTAL AREA(ACRES) =       58.8   TOTAL RUNOFF(CFS) =     150.33
  TC(MIN.) =   17.38

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     26.00 IS CODE =  81    A25
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.716
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8873
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    1.20   SUBAREA RUNOFF(CFS) =    2.89
  TOTAL AREA(ACRES) =       60.0   TOTAL RUNOFF(CFS) =     153.22
  TC(MIN.) =   17.38

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     27.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1260.50  DOWNSTREAM(FEET) =  1259.80
  FLOW LENGTH(FEET) =   193.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  63.0 INCH PIPE IS  45.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.08
  ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     153.22
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =   17.74
  LONGEST FLOWPATH FROM NODE     17.00 TO NODE     27.00 =    2605.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 IS CODE =  81      A26
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.690
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8872
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    3.50   SUBAREA RUNOFF(CFS) =    8.35
  TOTAL AREA(ACRES) =       63.5   TOTAL RUNOFF(CFS) =     161.57
  TC(MIN.) =   17.74

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

```
 FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 IS CODE =  81     A27
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.690
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8872
 SOIL CLASSIFICATION IS "D"
 SUBAREA AREA(ACRES) =    1.30   SUBAREA RUNOFF(CFS) =    3.10
 TOTAL AREA(ACRES) =       64.8   TOTAL RUNOFF(CFS) =     164.67
 TC(MIN.) =   17.74

****************************************************************************
 FLOW PROCESS FROM NODE     27.00 TO NODE     28.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1259.80  DOWNSTREAM(FEET) =  1259.50
 FLOW LENGTH(FEET) =    71.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  49.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.58
 ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     164.67
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   17.86
 LONGEST FLOWPATH FROM NODE     17.00 TO NODE     28.00 =    2676.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     28.00 TO NODE     28.00 IS CODE =  81     A28
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.681
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8872
 SOIL CLASSIFICATION IS "D"
 SUBAREA AREA(ACRES) =    1.50   SUBAREA RUNOFF(CFS) =    3.57
 TOTAL AREA(ACRES) =       66.3   TOTAL RUNOFF(CFS) =     168.24
 TC(MIN.) =   17.86

****************************************************************************
 FLOW PROCESS FROM NODE     28.00 TO NODE     29.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1259.50  DOWNSTREAM(FEET) =  1257.40
 FLOW LENGTH(FEET) =   573.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  63.0 INCH PIPE IS  49.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.21
 ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     168.24
 PIPE TRAVEL TIME(MIN.) =   1.04    Tc(MIN.) =   18.90
 LONGEST FLOWPATH FROM NODE     17.00 TO NODE     29.00 =    3249.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     29.00 TO NODE     29.00 IS CODE =  81     A29
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
================================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.609
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8869
 SOIL CLASSIFICATION IS "D"
 SUBAREA AREA(ACRES) =    0.30   SUBAREA RUNOFF(CFS) =    0.69
 TOTAL AREA(ACRES) =      66.6   TOTAL RUNOFF(CFS) =    168.94
 TC(MIN.) =   18.90

****************************************************************************
 FLOW PROCESS FROM NODE     29.00 TO NODE     29.00 IS CODE =  81     A30
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.609
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8869
 SOIL CLASSIFICATION IS "D"
 SUBAREA AREA(ACRES) =    2.20   SUBAREA RUNOFF(CFS) =    5.09
 TOTAL AREA(ACRES) =      68.8   TOTAL RUNOFF(CFS) =    174.03
 TC(MIN.) =   18.90

****************************************************************************
 FLOW PROCESS FROM NODE     29.00 TO NODE     29.00 IS CODE =  81     A31
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.609
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8869
 SOIL CLASSIFICATION IS "D"
 SUBAREA AREA(ACRES) =    0.30   SUBAREA RUNOFF(CFS) =    0.69
 TOTAL AREA(ACRES) =      69.1   TOTAL RUNOFF(CFS) =    174.72
 TC(MIN.) =   18.90

****************************************************************************
 FLOW PROCESS FROM NODE     29.00 TO NODE     81.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1257.40  DOWNSTREAM(FEET) =  1238.70
 FLOW LENGTH(FEET) =  1020.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  36.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  17.12
 ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     174.72
 PIPE TRAVEL TIME(MIN.) =   0.99    Tc(MIN.) =   19.89
 LONGEST FLOWPATH FROM NODE     17.00 TO NODE     81.00 =    4269.00 FEET.
                        END OF SUB-AREA A
****************************************************************************
 FLOW PROCESS FROM NODE     40.00 TO NODE     41.00 IS CODE =  21     B1
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
        ASSUMED INITIAL SUBAREA UNIFORM
        DEVELOPMENT IS COMMERCIAL
 TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   306.00
 UPSTREAM ELEVATION(FEET) =   1277.00
```

```
 DOWNSTREAM ELEVATION(FEET) =   1274.10
 ELEVATION DIFFERENCE(FEET) =      2.90
 TC = 0.303*[(  306.00**3)/(     2.90)]**.2 =    7.595
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.039
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8911
 SOIL CLASSIFICATION IS "D"
 SUBAREA RUNOFF(CFS) =      5.04
 TOTAL AREA(ACRES) =      1.40   TOTAL RUNOFF(CFS) =      5.04

****************************************************************************
 FLOW PROCESS FROM NODE     41.00 TO NODE     42.00 IS CODE =  91    B2
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =   1274.10
 DOWNSTREAM NODE ELEVATION(FEET) =   1270.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =   455.00
 "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.330
 PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0300
 PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.02000
 MAXIMUM DEPTH(FEET) =   1.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.216
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8891
 SOIL CLASSIFICATION IS "D"
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      7.90
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.64
 AVERAGE FLOW DEPTH(FEET) =   0.58   FLOOD WIDTH(FEET) =   28.53
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =   4.62   Tc(MIN.) =   12.22
 SUBAREA AREA(ACRES) =    2.00       SUBAREA RUNOFF(CFS) =    5.72
 TOTAL AREA(ACRES) =       3.4         PEAK FLOW RATE(CFS) =      10.76

 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =  0.62   FLOOD WIDTH(FEET) =   33.29
 FLOW VELOCITY(FEET/SEC.) =   1.71   DEPTH*VELOCITY(FT*FT/SEC) =   1.06
 LONGEST FLOWPATH FROM NODE     40.00 TO NODE     42.00 =     761.00 FEET.
                    END OF SUB-AREA B
****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     30.00 IS CODE =  21   C1
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
 TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   255.00
 UPSTREAM ELEVATION(FEET) =   1276.50
 DOWNSTREAM ELEVATION(FEET) =   1274.00
 ELEVATION DIFFERENCE(FEET) =      2.50
 TC = 0.303*[(  255.00**3)/(     2.50)]**.2 =    7.013
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.196
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8914
 SOIL CLASSIFICATION IS "D"
 SUBAREA RUNOFF(CFS) =      1.87
 TOTAL AREA(ACRES) =      0.50   TOTAL RUNOFF(CFS) =      1.87

****************************************************************************
 FLOW PROCESS FROM NODE     30.00 TO NODE     31.00 IS CODE =  61   C2
```

```
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) = 1274.00  DOWNSTREAM ELEVATION(FEET) = 1270.00
  STREET LENGTH(FEET) =   357.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  25.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.84
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.36
    HALFSTREET FLOOD WIDTH(FEET) =    9.85
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.45
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.87
  STREET FLOW TRAVEL TIME(MIN.) =   2.43   Tc(MIN.) =    9.44
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.639
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8902
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    0.60      SUBAREA RUNOFF(CFS) =    1.94
  TOTAL AREA(ACRES) =        1.1        PEAK FLOW RATE(CFS) =       3.81

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  11.27
  FLOW VELOCITY(FEET/SEC.) =  2.61   DEPTH*VELOCITY(FT*FT/SEC.) =   1.00
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     31.00 =     612.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     31.00 TO NODE     31.00 IS CODE =  81     C3
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.639
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8902
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    1.90   SUBAREA RUNOFF(CFS) =    6.16
  TOTAL AREA(ACRES) =        3.0   TOTAL RUNOFF(CFS) =       9.97
  TC(MIN.) =    9.44

****************************************************************************
  FLOW PROCESS FROM NODE     31.00 TO NODE     32.00 IS CODE =  61     C4
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) = 1270.00  DOWNSTREAM ELEVATION(FEET) = 1266.50
  STREET LENGTH(FEET) =   350.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  25.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
```

```
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.86
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.52
   HALFSTREET FLOOD WIDTH(FEET) =   17.89
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.21
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.65
 STREET FLOW TRAVEL TIME(MIN.) =   1.82   Tc(MIN.) =   11.26
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.344
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8894
 SOIL CLASSIFICATION IS "D"
 SUBAREA AREA(ACRES) =    0.60      SUBAREA RUNOFF(CFS) =    1.78
 TOTAL AREA(ACRES) =       3.6        PEAK FLOW RATE(CFS) =      11.75

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.53   HALFSTREET FLOOD WIDTH(FEET) =  18.49
 FLOW VELOCITY(FEET/SEC.) =  3.26   DEPTH*VELOCITY(FT*FT/SEC.) =   1.72
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     32.00 =     962.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     32.00 TO NODE     32.00 IS CODE =  81   CS
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.344
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8894
 SOIL CLASSIFICATION IS "D"
 SUBAREA AREA(ACRES) =    2.90   SUBAREA RUNOFF(CFS) =    8.63
 TOTAL AREA(ACRES) =       6.5   TOTAL RUNOFF(CFS) =      20.38
 TC(MIN.) =   11.26

****************************************************************************
 FLOW PROCESS FROM NODE     32.00 TO NODE     33.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1257.50  DOWNSTREAM(FEET) =  1257.00
 FLOW LENGTH(FEET) =   169.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.04
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      20.38
 PIPE TRAVEL TIME(MIN.) =   0.56    Tc(MIN.) =   11.82
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     33.00 =    1131.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 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.) =   11.82
  RAINFALL INTENSITY(INCH/HR) =   3.27
  TOTAL STREAM AREA(ACRES) =      6.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      20.38

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     35.00 IS CODE =  21    C6
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
         ASSUMED INITIAL SUBAREA UNIFORM
         DEVELOPMENT IS COMMERCIAL
  TC = K*[(LENGTH**3)/(ELEVATION CHANGE)]**.2
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   312.00
  UPSTREAM ELEVATION(FEET) =   1276.00
  DOWNSTREAM ELEVATION(FEET) =   1272.00
  ELEVATION DIFFERENCE(FEET) =      4.00
  TC = 0.303*[(  312.00**3)/(     4.00)]**.2 =    7.206
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.142
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8913
  SOIL CLASSIFICATION IS "D"
  SUBAREA RUNOFF(CFS) =      1.11
  TOTAL AREA(ACRES) =      0.30   TOTAL RUNOFF(CFS) =      1.11

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     36.00 IS CODE =  61     C7
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STANDARD CURB SECTION USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) = 1272.00  DOWNSTREAM ELEVATION(FEET) = 1264.50
  STREET LENGTH(FEET) =   687.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  25.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.26
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.34
    HALFSTREET FLOOD WIDTH(FEET) =    8.86
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.32
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.78
  STREET FLOW TRAVEL TIME(MIN.) =   4.94   Tc(MIN.) =   12.14
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.225
  COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8891
  SOIL CLASSIFICATION IS "D"
  SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    2.29
  TOTAL AREA(ACRES) =        1.1        PEAK FLOW RATE(CFS) =       3.40

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  10.78
  FLOW VELOCITY(FEET/SEC.) =  2.52   DEPTH*VELOCITY(FT*FT/SEC.) =   0.94
```

```
 LONGEST FLOWPATH FROM NODE     34.00 TO NODE     36.00 =     999.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  81      C8
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.225
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8891
 SOIL CLASSIFICATION IS "D"
 SUBAREA AREA(ACRES) =    0.30   SUBAREA RUNOFF(CFS) =    0.86
 TOTAL AREA(ACRES) =       1.4   TOTAL RUNOFF(CFS) =      4.26
 TC(MIN.) =   12.14

****************************************************************************
 FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  81      C9
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.225
 COMMERCIAL DEVELOPMENT RUNOFF COEFFICIENT = .8891
 SOIL CLASSIFICATION IS "D"
 SUBAREA AREA(ACRES) =    5.90   SUBAREA RUNOFF(CFS) =   16.92
 TOTAL AREA(ACRES) =       7.3   TOTAL RUNOFF(CFS) =     21.18
 TC(MIN.) =   12.14

****************************************************************************
 FLOW PROCESS FROM NODE     36.00 TO NODE     33.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1259.00  DOWNSTREAM(FEET) =  1257.00
 FLOW LENGTH(FEET) =    54.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.42
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      21.18
 PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   12.21
 LONGEST FLOWPATH FROM NODE     34.00 TO NODE     33.00 =    1053.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 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.) =   12.21
 RAINFALL INTENSITY(INCH/HR) =   3.22
 TOTAL STREAM AREA(ACRES) =     7.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     21.18

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

```
     1       20.38     11.82         3.268          6.50
     2       21.18     12.21         3.217          7.30

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

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF       Tc       INTENSITY
  NUMBER      (CFS)     (MIN.)    (INCH/HOUR)
      1       40.88     11.82        3.268
      2       41.24     12.21        3.217

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       41.24   Tc(MIN.) =   12.21
  TOTAL AREA(ACRES) =        13.8
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     33.00 =    1131.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     80.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1257.00  DOWNSTREAM(FEET) =  1238.70
  FLOW LENGTH(FEET) =   810.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.93
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      41.24
  PIPE TRAVEL TIME(MIN.) =   1.04    Tc(MIN.) =   13.26
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     80.00 =    1941.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       13.8  TC(MIN.) =     13.26
  PEAK FLOW RATE(CFS)    =      41.24
============================================================================
============          END OF SUB-AREA C          ============================
  END OF RATIONAL METHOD ANALYSIS
```