E: Hydrology Report and Water Quality Management Plan

FUSCOE
ENGINEERING

PRELIMINARY HYDROLOGY REPORT

MULTI-USE DEVELOPMENT AT FORMER IRWD SITE

Lake Forest, California

Prepared For
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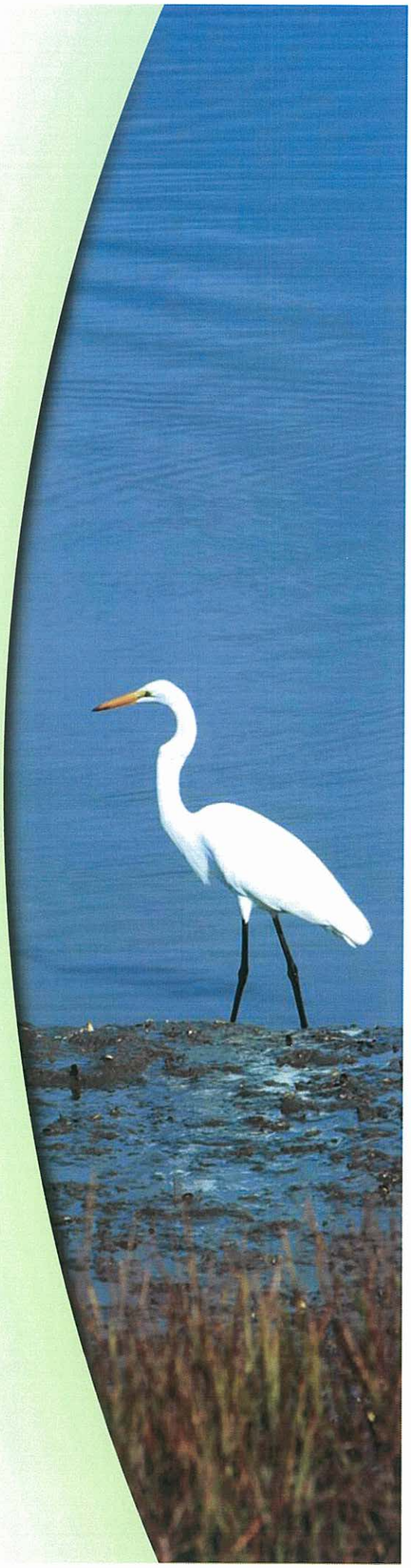

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Date Prepared:

March 2010

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1.0 INTRODUCTION

1.1 GEOGRAPHIC SETTING

The Study area consists of 99 acres± and is located in the City of Lake Forest, California. It lies south of Commerce Centre Drive and is bound to the north and east by an existing commercial development, and to the south by the Baker water treatment facility. See Figure 1, Vicinity Map.

1.2 PURPOSE OF THIS REPORT

The purpose of this report is to accomplish the following objectives:

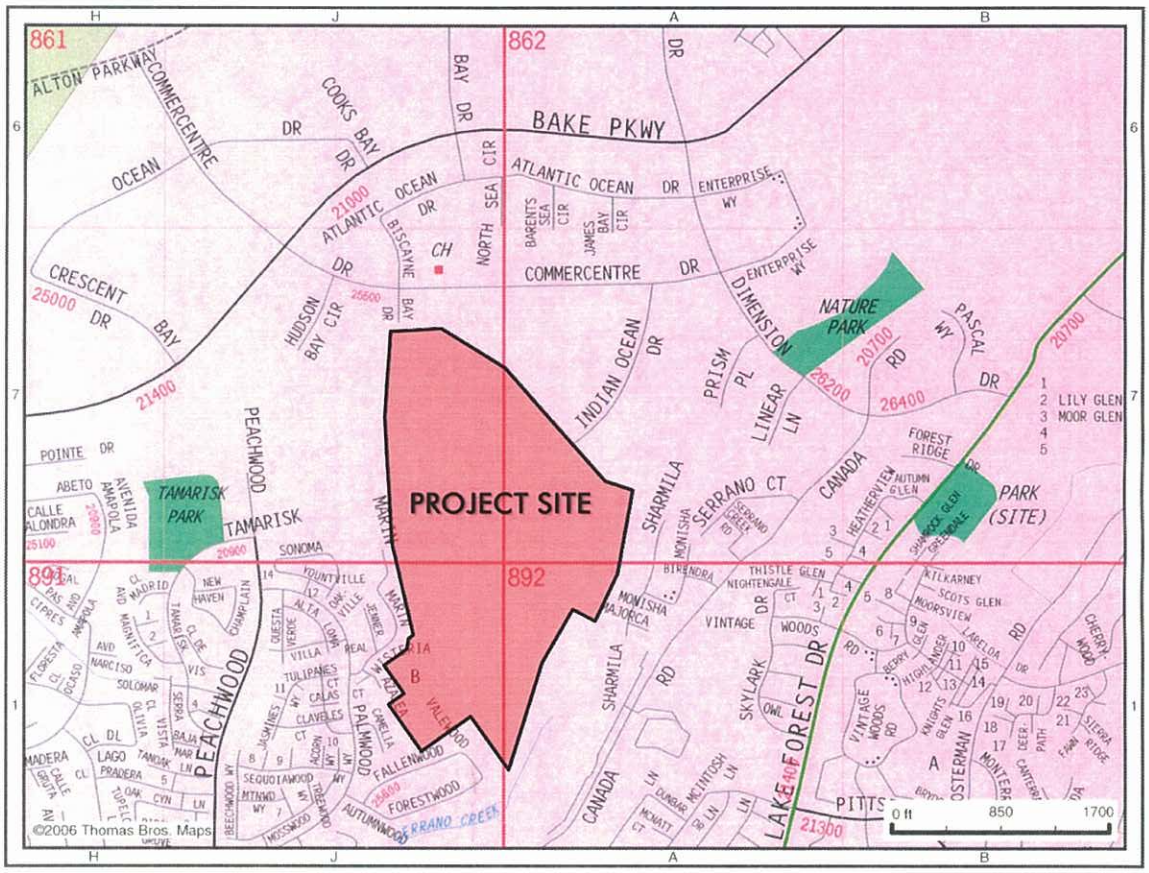
To determine the storm water discharges generated within the project under existing and proposed conditions. (see Appendices 2 and 3).

To evaluate discharges and comment on the design and make recommendations regarding the design and possible storm drain and hydrology related issues in regard to Serrano Creek.

1.3 REFERENCES

- O.C.E.M.A. Hydrology Manual
- O.C.E.M.A. Design Manual

1.4 PROJECT SITE LOCATION MAP



2.0 EXISTING TOPOGRAPHIC & HYDROLOGIC CONDITIONS

2.1 EXISTING TOPOGRAPHY

The site has been rough graded per the Los Alisos Water District (LAWD) plans "Zone 1 – Emergency Storage Reservoirs", 1989 record drawings. Los Alisos Water District has been taken over by Irvine Ranch Water District (IRWD).

The site slopes generally toward the east and Serrano Creek. The site was graded with a variety of basins, ridges and terraced slopes. Significant to the site is a deep ravine on the northeasterly portion of the property. A large portion of the development site drains to this heavily wooded and brushed tributary to Serrano Creek.

2.2 EXISTING DRAINAGE PATTERN

There is no run-on to the site from outside areas. The majority of the site currently flows easterly into Serrano Creek via three existing pipe discharge points. Three small areas also sheet flow directly to Serrano Creek. Those areas (designated OS-3, 4 & 5) are not a part of the development area and their drainage patterns will not be changed.

The current drive approach to the site from Biscayne Bay Drive (designated OS-1 & 2), sheet flows toward Biscayne Bay Drive where flow is picked up via an existing street catch basin.

Two small areas (designated OS-6 & 7), on the west side of the current IRWD buildings, flow to existing developed areas and their existing terrace drains. There areas are not part of the development area and their flow pattern will not change.

Two areas (designated OS-8 & 9), on the west side of the development site, sheet flow westerly into undeveloped land. There is a proposed tract over a portion of the undeveloped land.

2.3 EXISTING STORM DRAIN FACILITIES

Per the LAWD plans previously cited and per visual inspection of the site, there are a number of basins and attendant pipes that currently serve the site. Those basins, risers, outlets and pipes are in various states of repair. Many of the basins are overgrown with brush and several of the outlet pipes were found to be partially buried by silt build-up. There are three outlets to Serrano Creek from the site in addition to the small areas that sheet flow to the creek.

Pipe 'A' drains a large portion of the development site and drains the ravine on the northeasterly portion of the site.

Pipe 'B' drains the abandoned LAWD headquarters building site, a portion of the 'emergency storage reservoir' site and the northerly parts of the above ground tank site.

Pipe 'C' drains the southerly portion of the IRWD above ground tank site. Pipe C is not a part of the development area and is not addressed in this report.

2.4 EXISTING CONDITIONS

3.0 PROPOSED STORM DRAIN FACILITIES

Seven (7) local storm drain systems are proposed for this project as follows:

3.1 STORM DRAIN LINES "A" THROUGH "F"

This system will drain the majority of the site and flows to the proposed detention and water quality basin located adjacent to existing water tanks. Storm flow will be detained in this basin during periods of peak rainfall and released through a proposed culvert to Serrano Creek. The outlet in Serrano Creek will consist of an outlet structure with rip rap to reduce outlet velocities into the creek. The peak 100 year event discharge at this outlet is approximately 134 cfs.

3.2 STORM DRAIN LINE "G"

This system will drain the future Civic Center site adjacent to Serrano Creek. Flow will be directed to a proposed detention and water quality basin adjacent to existing outlet A before being released into Serrano Creek. The outlet of this basin will join the exist 72" pipe at outlet A. The peak 100 year event discharge at this outlet is approximately 33 cfs.

The total 100 year peak discharge from both outlets is approximately 167 cfs with detention. This is less than the existing flow of approximately 200 cfs into Serrano Creek.

4.0 HYDROLOGY STUDY

4.1 STORM FREQUENCY

For the purposes of this study, the 100-year hydrology was calculated. The existing hydrology was calculated for the two outlet points that will be affected by the development. Proposed hydrology for the rough grade state was calculated. Only a conceptual site plan was available for use in this study, therefore a proposed hydrology was calculated using the proposed uses of the various development areas using Alternative IX. No storm drain or street layouts were available, so only a very preliminary storm drain layout was used. Times of concentration could be expected to be longer in the developed condition with actual street and storm drain layouts.

In addition to the 100 year discharge the 2 year discharge under existing and proposed conditions was also calculated.

The 2 year discharge and volumes were used to evaluate the hydrologic conditions of concern to be evaluated in the Water Quality Management Plan (WQMP).

4.2 METHODOLOGY

The hydrology was prepared in conformance with the Orange County Hydrology Manual using AES software (Appendix 3).

Unit hydrographs were then developed using AES software to determine discharge volumes for the proposed condition. Hydrographs for 100 year flows were then routed through the proposed detention basins using HydroCAD modeling software (Appendix 4).

Unit hydrographs were also developed for the 2 year event using existing and proposed conditions. This analysis was done to determine the volume that may or may not need to be retained onsite as part of the new water quality requirements.

5.0 HYDRAULIC REPORT
(ANALYSIS OF THE MAIN LINE STORM DRAIN)

Hydraulic analysis of mainline storm drains will be determined during final plan preparation of the project site.

6.0 DESIGN CRITERIA

The proposed storm drain systems will be designed so as to be consistent with the following goals and guidelines:

A. All buildings shall be protected from flooding during a 100-year frequency storm.

B. 1. Onsite design storm is based on a 25-year frequency. In sump conditions for catch basins and the connecting storm drains also use a 25-year frequency.

   2. Offsite design storm frequency, subject to individual review by the City, should be in accordance with the O.C.E.M.A. Hydrology Manual.

C. 1. Velocity should not exceed 20 FPS in a standard wall R.C.P.

   2. Where velocity exceeds 20 FPS, a special wall R.C.P. with a minimum of 1½-inch steel clearance on the inside surface shall be used.

   3. Maximum velocity in special cover R.C.P. shall be 45 FPS.

D. On arterial highways, one (1) 12' lane each direction should be clear of water, with a 10-year storm. In sump conditions, a 25-year storm event shall be used.

E. On local streets, flow should not exceed top of curb, for a 10-year storm event, and in sump conditions, a 25-year storm event shall be used.

Cross gutter is not allowed at any through street.

F. Catch basins are to be constructed at all four corners of arterial highway intersections.

G. Open cut is not allowed at any existing arterial highway. Pipe must be jacked across street.

H. Maximum W.S. in CB's for design conditions shall be 0.5' below inlet (FL.) elevation.

I. Once water is picked up in a storm drain, it should remain in the system.

J. Pipe size may not be decreased downstream without the City's approval.

K. Branching of flow is not allowed.

L. Provide hydraulic and energy grade line calculations and plot of hydraulic grade line on plans with table of appropriate hydraulic data.

M. The ratio of normal velocity to critical velocity should be less than 0.9 or greater than 1.2.

N. All pipes and conduits laid parallel to the roadway shall be placed at least 30" below the roadway surface. However, when pipe depth is in excess of 10' (measured from top of pipe to ground surface), the City's approval is required prior to the initial design of the system.

O. Junction structures should be designed according to the O.C.F.C.D. "Design Manual" or utilize City of Orange Standard Plans.

P. Storm Drain Easement width shall be determined in the following manner:

1. D = 36" or smaller – Distance from top of pipe to ground level times 1.5 + diameter of pipe +2.0' (When cover exceeds 10', use 2 below.)
2. D = 39" or greater – a. Distance from bottom of pipe to ground level times 2.0 + diameter of pipe + 2.0'.

In any case, the width of easement shall not be less than 10.0' in width.

Q. Easement shall be exclusively for storm drain purposes.

R. Storm drain with high fills:

1. Fill Greater than 40 Feet

   Storm drains which are installed with cover greater than 40 feet shall have a diameter a minimum of 12 inches larger than that required for hydraulic adequacy and shall be constructed using pre-stressed concrete pipe.*

2. Fill between 30 and 40 Feet

   Storm drains which are installed with cover between 30 and 40 feet shall have a diameter a minimum of 12 inches larger than that required for hydraulic adequacy and shall be constructed using pre-stressed concrete pipe if the subgrade of the pipe is in a fill area.* If subgrade is in native soil, reinforced concrete pipe may be used.

3. Fill Between 20 and 30 Feet

   Storm drains which are installed with cover between 20 and 30 feet shall be constructed using reinforced concrete pipe. A pipe diameter greater than that required for hydraulic adequacy may be required if, in the opinion of the City Engineer's staff, the particular conditions involved warrant the larger size.

4. Fill Less Than 20 Feet

   Normal criteria for storm drain design shall be followed.

* Exceptions may be made for a roadway crossing of a natural watercourse which will remain undisturbed with future development.

7.0 RESULTS AND CONCLUSIONS

At outlet A to Serrano Creek the 100 year peak discharge is approximately 33 cfs. This is 112 cfs less than the existing condition due to site configuration and detention See Exhibit A on next page.

At outlet B to Serrano Creek the 100 year peak discharge is approximately 133 cfs after detention. This is approximately 78 cfs more than the existing condition.

Overall, flows discharged to Serrano Creek is approximately 33 cfs less than the existing condition. The reach of the creek upstream of outlet B will have flow reduced by approximately 112 cfs during the 100 year event. This will greatly reduce the potential for erosion in this reach. Downstream of outlet B the reduced total flow also reduces the potential for erosion, upstream of outlet A the flow in the creek Is not affected by the project. This includes the reach of the creek adjacent to homes on Sharmillo Drive. The table below summarizes these discharges to each existing outlet to Serrano Creek.

Existing Outlet	Exist. Q_{100}	Prop Q_{100}
A	145 cfs	33 cfs
B	55 cfs	134 cfs
TOTAL	200 cfs	167 cfs +/-

Under the 2 year event no more than 105% of the pre development volume and peak flow will be allowed to flow off site. This may be accomplished in a variety of ways which is discussed in more detail within the WQMP. Shown below is a table summarizing the 2 year event conditions.

Summary of 2 Year Event Conditions

Outlet A

	Existing Conditon				Proposed Condition			
Sub Area	Area (ac)	Q (cfs)	TC (min)	Vol (ac-ft)	Area (ac)	Q (cfs)	TC (min)	Vol (ac-ft)
Area A	59.6	38.38	20.96	4.02				
Civic Center					12.4	20.54	6.63	
Direct to Creek					2.95	1.3	25.39	
Totals	59.6	38.38	20.96	4.02	15.35	21.84	6.63	1.63

Outlet B

	Existing Conditon				Proposed Condition			
Sub Area	Area (ac)	Q (cfs)	TC (min)	Vol (ac-ft)	Area (ac)	Q (cfs)	TC (min)	Vol (ac-ft)
Area B	15.4	17.61	8.95	0.98				
Area A					63.4	73.06	8.36	
Tank Site					3.83	3.46	13.07	
Totals	15.4	17.61	8.95	0.98	67.23	76.52	8.36	6.69

Project Totals

	Existing Conditon				Proposed Condition			
	Area (ac)	Q (cfs)	TC (min)	Vol (ac-ft)	Area (ac)	Q (cfs)	TC (min)	Vol (ac-ft)
Difference In Area Is Due To Areas OS-8 & OS-9	75	55.99		5.0	82.58	98.36		8.32

5% of existing condition volume = 0.25 ac-ft

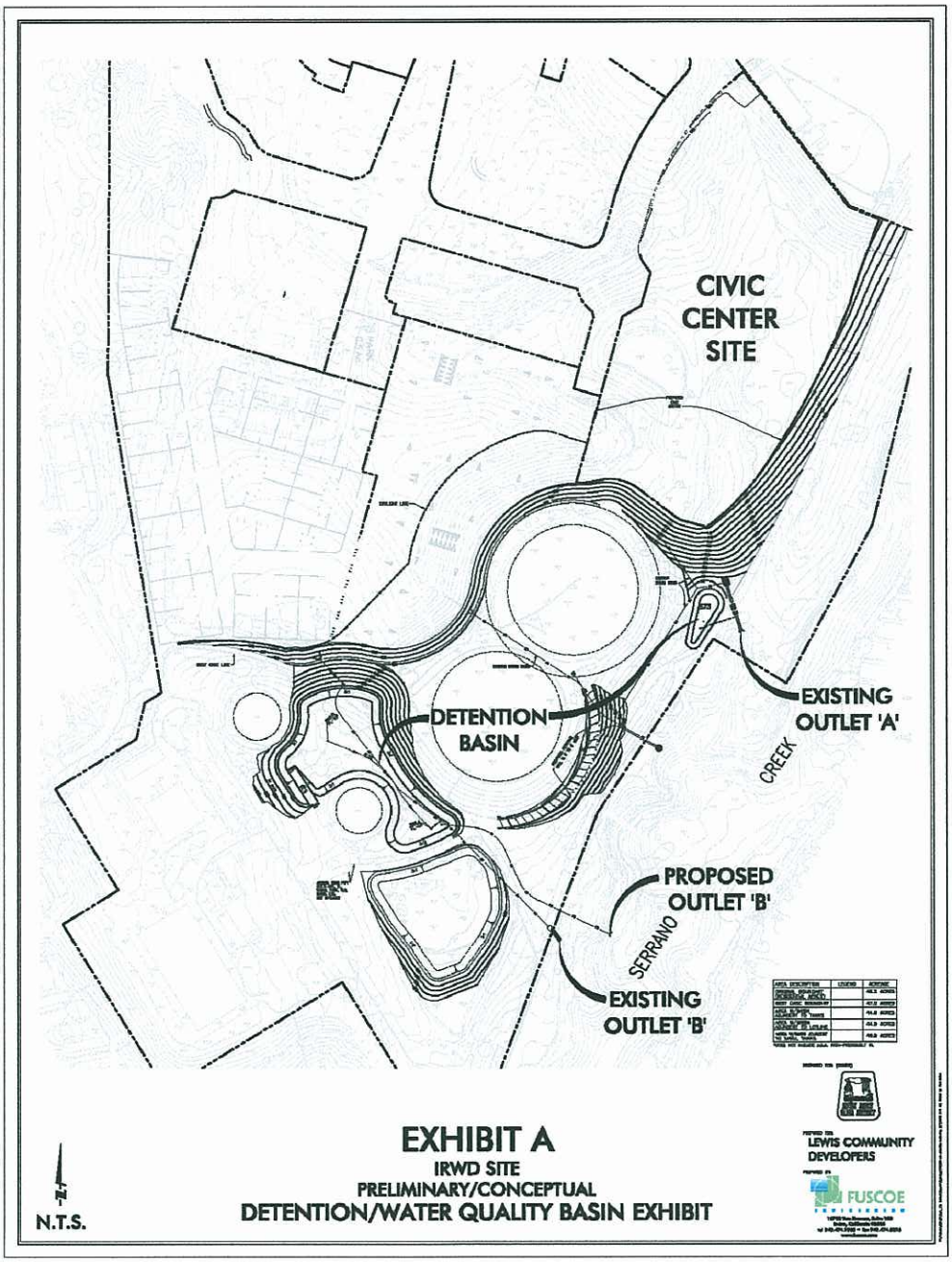
Therefore acceptable total volume = 5.25 ac-ft

Proposed condition total volume = 8.32 ac-ft

Therefore total volume to be retained onsite = 8.32-5.25=3.07 ac-ft

As shown in the table the total additional volume due to development is approximately 3.3 ac-ft. Additional discussion of retention alternatives is presented in the WQMP for the project.

7.1 DETENTION/WATER QUALITY BASIN – EXHIBIT A



8.0 APPENDICES

Appendix 1	*Storm Water Protection Goals*
Appendix 2	*Preliminary 100-Year Existing Hydrology*
Appendix 3	*Preliminary 100 year Proposed Hydrology*
Appendix 4	*Detention Calculations*
Appendix 5	*Hydromodification*
	a. 2 year existing hydrology and hydrograph *b. 2 year proposed hydrology and hydrograph* c. Upper retention site hydrograph d. Middle retention site hydrograph
Appendix 6	*Local Existing Hydrology Map (In Pocket)*
Appendix 7	*Local Proposed Hydrology Map (In Pocket)*

CHAPTER 1

DESIGN CRITERIA

The following design criteria shall be used for storm drain and local drainage structures built for dedication to the County of Orange, Orange County Flood Control District, or for private facilities within unincorporated Orange County.

Regional or Sub-Regional design storm frequencies are subject to individual review by the Agency and should be in accordance with the 1986 Hydrology Manual and Flood Protection Goals. This manual does not supersede any information contained within the Orange County Drainage Area Management Plan (DAMP), and is intended to be consistent with the DAMP.

I. PROTECTION LEVELS

A. Structures

The goal is to provide 100-year protection for all habitable structures pursuant to Public Services and Facilities Element of the General Plan.

B. Streets

Street criteria for 100-year storm flow is shown on the attached Figure 1-1, Flood Protection Goals.

1. Arterial Highway

   a. One travel lane (use 12 foot if not determined) shall be free from inundation in each direction in a 10-year storm.

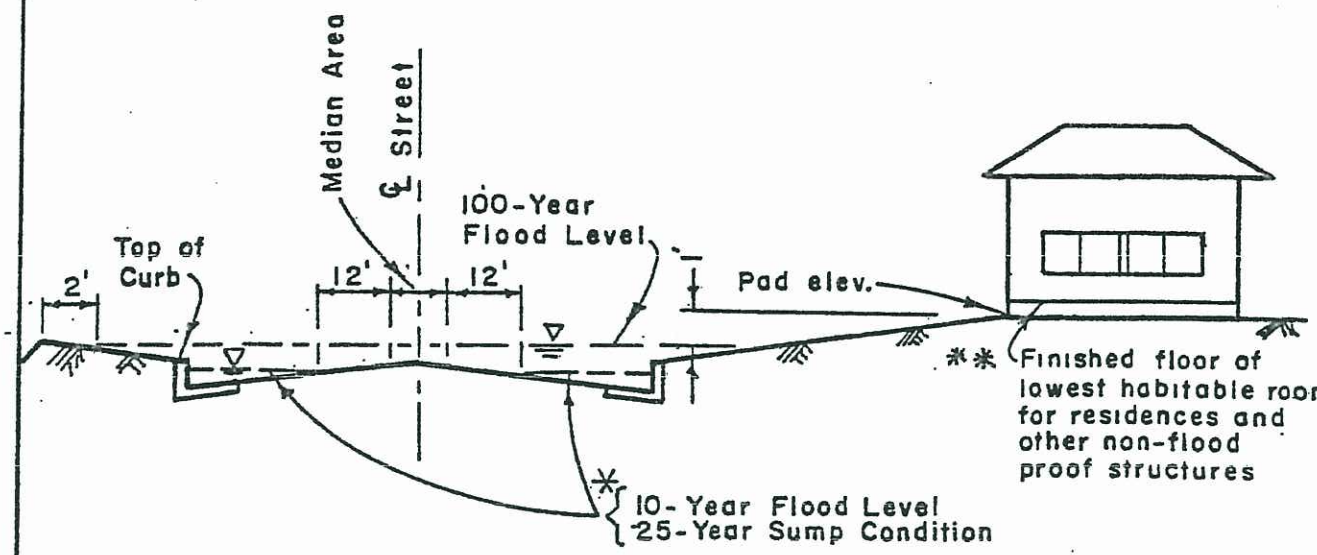
   b. In a sump condition, one travel lane (use 12 foot if not determined) shall be free from inundation in each direction in a 25-year storm.

   c. Median and left-turn pockets shall not be considered as a travel lane.

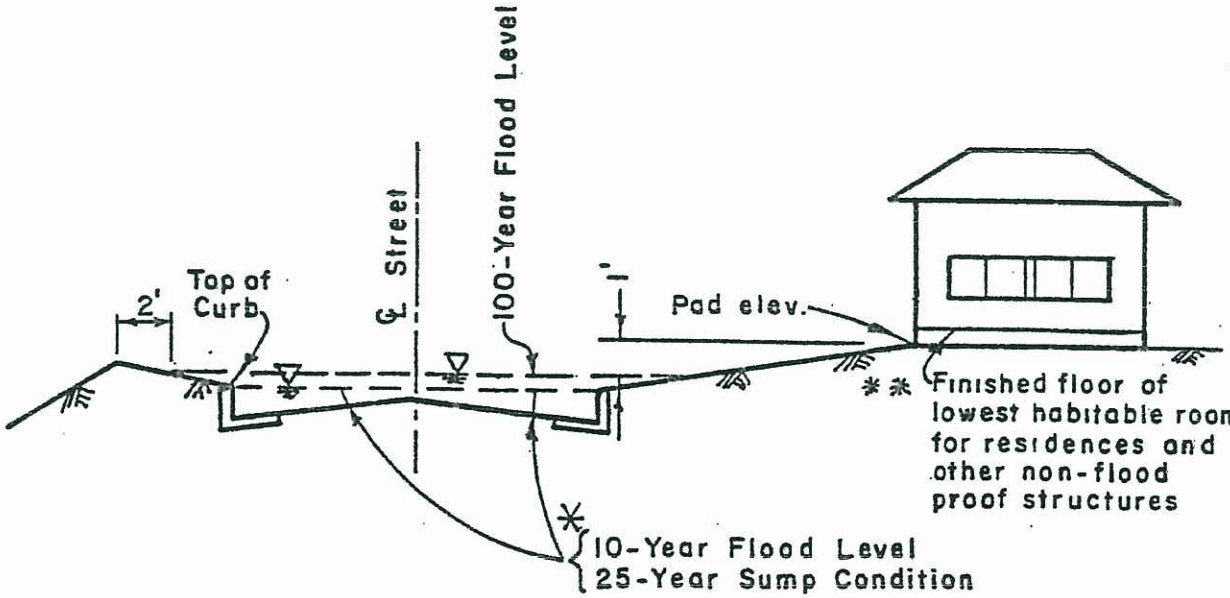
   d. In places where superelevation occurs on arterial highways an inlet shall be provided as necessary to preclude drainage across the travel lanes. The catch basin shall intercept a minimum of a 10-year storm. Local depressions are not to be used for inlets at medians; grate opening or side opening/grate combination (for which future paving overlap will not create a drop) are recommended. Flooding width from median curbs in superelevated sections shall not exceed two feet.

C. General Criteria

1. Storm drains with tributary areas of less than 640 acres are to be designed for a minimum of 10-year frequency below top of curb



ARTERIAL HIGHWAY



LOCAL STREET

NOTE

* For Arterial Hwy and Local Street, depth times velocity cannot exceed six

** The elevation of the lowest floor of buildings, including basements or cellars, must be at least 1 foot above the 100-year flood water surface elevation pursuant to Section 7-9-113.5 of the County Ordinance.

ORANGE COUNTY E.M.A.		
FLOOD PROTECTION GOALS		
1986	1 OF 1	

Figure 1-1

using a combination of street and storm drain flow. In sump conditions, catch basins and the connecting storm drains should be designed to a 25-year frequency.

2. Regional or Sub-Regional design storm frequency are subject to individual review by the Agency and should be in accordance with the 1986 Hydrology Manual and Flood Protection Goals and must be designed to contain, as a minimum, the Federal Emergency Management Agency's (FEMA) 100-year discharges used for defining Flood Insurance Rate Map floodplains.

3. The product of the depth of water, y (ft.) at the curb times velocity, v (fps), shall not exceed six for any street. This criteria applies to storms up to a 25-year frequency.

4. Leveed channels are generally prohibited for local drainage applications. The use of leveed channels or floodwalls* in local drainage situations shall include appropriate justification.

II. FREEBOARD

A. Purpose

Freeboard is provided to insure that the desired degree of protection will not be reduced by unaccounted factors which may affect channel hydraulics but which are not required to be specifically analyzed in design. These factors include, but are not limited to, variations in Manning's "n" due to channel bottom conditions, uncertainties in the selection of Manning's "n", variation in stage-discharge relationships, variation in velocity from average velocity, sedimentation, debris, bulking, and air entertainment. When any of the above factors are expected to be significant, its effect shall be separately estimated and necessary provisions included in design to account for same.

B. Reference Elevations

Freeboard is the vertical distance from the design hydraulic grade line as defined below and as shown in Figure 1-2.

1. Top of levee in ultimate unlined earth levee channels.

2. Top of rock where riprap slope protection is utilized.

3. Top of wall or structural section in concrete channels.

4. Soffit where box-conduits or culverts are designed as open channels.

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*A floodwall is a wall, in lieu of a levee, which projects above the surrounding ground for the purpose of conveying flood waters. See summary of FEMA's National Flood Insurance Program regulations § 65.10.44 CFR (revised October 1, 1993) in Appendix 2. Engineers designing flood control levees should refer to FEMA's latest regulations before commencing design.

EL TORO

MARINE CORPS

AIR STATION

A N J O A Q U I N

T R A B U C O

El Toro Marine Sch

AQUEDUCT

Agua

BOUNDARY

RESERVATION

Borrego

Canyon

Creek

Wash

NAVAL

County Industrial Farm

Sewage Disposal

Golf Course

ATCHISON TOPEKA AND SANTA FE

CONSTRUCTION

UNDER

BM 345

BM 270

BM 344

BM 359

BM 458

BM 582

BM 687

BM 745

BM 799

BM 861

Chinon

6 LANE FREEWAY

SAN DIEGO

INDEFINITE

AVE

Drill Hole

El Toro Game Bird Club

Ascension Cem

Serrano Place

El Toro Cem

Water Tank

Well

Filtration Plant

CANADA

ROAD

Gravel Pits

Aliso

Serrano

English

Oso

EXISTING AREA A

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
         (c) Copyright 1983-2007 Advanced Engineering Software (aes)
             Ver. 13.5  Release Date: 02/06/2007  License ID 1355

                          Analysis prepared by:

                          Fuscoe Engineering, Inc
                    16795 Von Karman Suite 100, Irvine Ca 92606


 ************************** DESCRIPTION OF STUDY **************************
* IRWD SITE - AREA A                                                      *
* 100 YEAR EXISTING HYDROLOGY                                             *
* 6/9/08   JEL                                                            *
 **************************************************************************

  FILE NAME: IRWD00A.DAT
  TIME/DATE OF STUDY: 10:37 06/09/2008
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   8.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  =====  ====== =====  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   14.0      9.0    0.020/0.020/0.050   0.33    2.00 0.0313 0.100 0.0140

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.33 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   252.00
  ELEVATION DATA: UPSTREAM(FEET) =    706.50  DOWNSTREAM(FEET) =    688.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.109
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.690
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
```

```
     LAND USE              GROUP   (ACRES)   (INCH/HR)   (DECIMAL)   CN   (MIN.)
  NATURAL POOR COVER
  "GRASS"                    C        0.55       0.25       1.000     97     8.11
  NATURAL POOR COVER
  "GRASS"                    B        0.22       0.30       1.000     93     8.11
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      3.07
  TOTAL AREA(ACRES) =      0.77   PEAK FLOW RATE(CFS) =      3.07

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =    688.30
  DOWNSTREAM NODE ELEVATION(FEET) =    658.40
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1247.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0500
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.07000
  MAXIMUM DEPTH(FEET) =   3.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.257
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)   (INCH/HR)   (DECIMAL)  CN
  NATURAL POOR COVER
  "GRASS"                    B        9.28       0.30       1.000     93
  NATURAL POOR COVER
  "GRASS"                    C       18.28       0.25       1.000     97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     34.36
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.88
  AVERAGE FLOW DEPTH(FEET) =   0.81   FLOOD WIDTH(FEET) =   26.39
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   7.21   Tc(MIN.) =   15.32
  SUBAREA AREA(ACRES) =   27.56       SUBAREA RUNOFF(CFS) =   74.17
  EFFECTIVE AREA(ACRES) =   28.33     AREA-AVERAGED Fm(INCH/HR) =   0.27
  AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       28.3         PEAK FLOW RATE(CFS) =      76.24

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  1.13   FLOOD WIDTH(FEET) =   35.50
  FLOW VELOCITY(FEET/SEC.) =   3.50   DEPTH*VELOCITY(FT*FT/SEC) =   3.95
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =    1499.00 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) =   643.00  DOWNSTREAM(FEET) =   636.00
  FLOW LENGTH(FEET) =   106.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.92
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      76.24
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   15.40
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =    1605.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     13.00 IS CODE =  82
```

```
----------------------------------------------------------------------------
  >>>>>ADD SUBAREA RUNOFF TO MAINLINE, AT MAINLINE Tc,<<<<<
  >>>>>(AND COMPUTE INITIAL SUBAREA RUNOFF)<<<<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   753.00
  ELEVATION DATA: UPSTREAM(FEET) =    697.80  DOWNSTREAM(FEET) =    640.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   16.715
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.099
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "CHAPARRAL,NARROWLEAF"      B        0.63      0.30      1.000    89   16.71
  NATURAL FAIR COVER
  "CHAPARRAL,NARROWLEAF"      C        3.06      0.25      1.000    95   16.71
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.69   INITIAL SUBAREA RUNOFF(CFS) =    9.43

  ** ADD SUBAREA RUNOFF TO MAINLINE AT MAINLINE Tc:
  MAINLINE Tc(MIN.) =   15.40
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.247
  SUBAREA AREA(ACRES) =    3.69      SUBAREA RUNOFF(CFS) =    9.93
  EFFECTIVE AREA(ACRES) =     32.02   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       32.0       PEAK FLOW RATE(CFS) =      85.92

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   636.00  DOWNSTREAM(FEET) =   615.00
  FLOW LENGTH(FEET) =   143.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  30.47
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      85.92
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   15.48
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.50 =    1748.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.50 TO NODE     14.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =    615.00
  DOWNSTREAM NODE ELEVATION(FEET) =    596.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   194.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.12500
  MAXIMUM DEPTH(FEET) =   3.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.216
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "CHAPARRAL,NARROWLEAF"      A        0.53      0.40      1.000    75
  NATURAL FAIR COVER
```

```
  "CHAPARRAL,NARROWLEAF"     B        1.63      0.30     1.000    89
  NATURAL FAIR COVER
  "CHAPARRAL,NARROWLEAF"     C        0.03      0.25     1.000    95
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.32
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     88.77
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  17.41
  AVERAGE FLOW DEPTH(FEET) =   0.59   FLOOD WIDTH(FEET) =   13.51
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.19   Tc(MIN.) =   15.67
  SUBAREA AREA(ACRES) =    2.19       SUBAREA RUNOFF(CFS) =    5.70
  EFFECTIVE AREA(ACRES) =   34.21     AREA-AVERAGED Fm(INCH/HR) =   0.27
  AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       34.2        PEAK FLOW RATE(CFS) =      90.71

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.60   FLOOD WIDTH(FEET) =   13.60
  FLOW VELOCITY(FEET/SEC.) =  17.53   DEPTH*VELOCITY(FT*FT/SEC) =  10.48
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     14.00 =    1942.00 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.) =   15.67
  RAINFALL INTENSITY(INCH/HR) =   3.22
  AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      34.21
  TOTAL STREAM AREA(ACRES) =      34.21
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      90.71

****************************************************************************
  FLOW PROCESS FROM NODE     31.00 TO NODE     32.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   365.00
  ELEVATION DATA: UPSTREAM(FEET) =    696.80  DOWNSTREAM(FEET) =    623.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.294
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.091
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "CHAPARRAL,NARROWLEAF"     B        0.48      0.30     1.000    89   10.29
  NATURAL FAIR COVER
  "CHAPARRAL,NARROWLEAF"     C        1.87      0.25     1.000    95   10.29
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      8.10
  TOTAL AREA(ACRES) =      2.35   PEAK FLOW RATE(CFS) =      8.10

****************************************************************************
  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) =   618.00  DOWNSTREAM(FEET) =   601.00
  FLOW LENGTH(FEET) =   116.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.02
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.10
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   10.41
  LONGEST FLOWPATH FROM NODE     31.00 TO NODE     33.00 =     481.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     14.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
================================================================================
  UPSTREAM NODE ELEVATION(FEET) =    601.00
  DOWNSTREAM NODE ELEVATION(FEET) =    596.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    76.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0500
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.12500
  MAXIMUM DEPTH(FEET) =   3.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.981
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "CHAPARRAL,NARROWLEAF"      B         0.01      0.30     1.000    89
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      8.12
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.26
  AVERAGE FLOW DEPTH(FEET) =   0.37   FLOOD WIDTH(FEET) =    9.95
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.39   Tc(MIN.) =   10.80
  SUBAREA AREA(ACRES) =    0.01       SUBAREA RUNOFF(CFS) =    0.03
  EFFECTIVE AREA(ACRES) =    2.36     AREA-AVERAGED Fm(INCH/HR) =   0.26
  AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        2.4         PEAK FLOW RATE(CFS) =       8.10
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.37   FLOOD WIDTH(FEET) =    9.95
  FLOW VELOCITY(FEET/SEC.) =   3.26   DEPTH*VELOCITY(FT*FT/SEC) =   1.20
  LONGEST FLOWPATH FROM NODE     31.00 TO NODE     14.00 =     557.00 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.) =   10.80
  RAINFALL INTENSITY(INCH/HR) =   3.98
  AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       2.36
  TOTAL STREAM AREA(ACRES) =       2.36
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       8.10
```

```
** CONFLUENCE DATA **
 STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
    1       90.71   15.67    3.216  0.27( 0.27) 1.00       34.2       10.00
    2        8.10   10.80    3.981  0.26( 0.26) 1.00        2.4       31.00

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

 ** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
    1       86.84   10.80    3.981  0.27( 0.27) 1.00       25.9       31.00
    2       97.15   15.67    3.216  0.27( 0.27) 1.00       36.6       10.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      97.15    Tc(MIN.) =    15.67
 EFFECTIVE AREA(ACRES) =      36.57   AREA-AVERAGED Fm(INCH/HR) =  0.27
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       36.6
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     14.00 =    1942.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   596.00  DOWNSTREAM(FEET) =   590.00
 FLOW LENGTH(FEET) =    82.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  23.71
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      97.15
 PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   15.72
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     15.00 =    2024.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  91
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =    590.00
 DOWNSTREAM NODE ELEVATION(FEET) =    578.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    29.00
 "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
 PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0500
 PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.00200
 MAXIMUM DEPTH(FEET) =   3.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.196
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "WOODLAND"                   B        0.01      0.30      1.000    75
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     97.16
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.33
 AVERAGE FLOW DEPTH(FEET) =   0.27   FLOOD WIDTH(FEET) =  211.00
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.11   Tc(MIN.) =   15.84
 SUBAREA AREA(ACRES) =    0.01       SUBAREA RUNOFF(CFS) =    0.03
 EFFECTIVE AREA(ACRES) =   36.58     AREA-AVERAGED Fm(INCH/HR) =   0.27
```

```
 AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       36.6         PEAK FLOW RATE(CFS) =      97.15
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =  0.26   FLOOD WIDTH(FEET) =  209.57
 FLOW VELOCITY(FEET/SEC.) =   4.39   DEPTH*VELOCITY(FT*FT/SEC) =   1.16
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     16.00 =    2053.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     50.00 TO NODE     51.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   297.00
 ELEVATION DATA: UPSTREAM(FEET) =    698.30  DOWNSTREAM(FEET) =    693.50

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.683
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.804
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL POOR COVER
 "GRASS"                     C        0.30      0.25     1.000    97   11.68
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      0.96
 TOTAL AREA(ACRES) =      0.30   PEAK FLOW RATE(CFS) =      0.96

****************************************************************************
 FLOW PROCESS FROM NODE     51.00 TO NODE     52.00 IS CODE =  91
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =    693.50
 DOWNSTREAM NODE ELEVATION(FEET) =    666.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1046.00
 "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
 PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0150
 PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.20000
 MAXIMUM DEPTH(FEET) =   3.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.235
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL POOR COVER
 "GRASS"                     C        2.50      0.25     1.000    97
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      4.10
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.56
 AVERAGE FLOW DEPTH(FEET) =   0.19   FLOOD WIDTH(FEET) =    6.28
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =   3.82   Tc(MIN.) =   15.51
 SUBAREA AREA(ACRES) =    2.50      SUBAREA RUNOFF(CFS) =    6.72
 EFFECTIVE AREA(ACRES) =    2.80    AREA-AVERAGED Fm(INCH/HR) =   0.25
```

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 AREA-AVERAGED Fp(INCH/HR) =   0.25  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        2.8         PEAK FLOW RATE(CFS) =       7.52

 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =  0.26   FLOOD WIDTH(FEET) =    6.96
 FLOW VELOCITY(FEET/SEC.) =   5.59   DEPTH*VELOCITY(FT*FT/SEC) =   1.43
 LONGEST FLOWPATH FROM NODE     50.00 TO NODE     52.00 =    1343.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     52.00 TO NODE     53.00 IS CODE =  91
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =    666.50
 DOWNSTREAM NODE ELEVATION(FEET) =    606.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   397.00
 "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
 PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0150
 PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.20000
 MAXIMUM DEPTH(FEET) =   3.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.168
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL POOR COVER
 "GRASS"                    A        0.03      0.40      1.000    85
 NATURAL POOR COVER
 "GRASS"                    B        1.53      0.30      1.000    93
 NATURAL POOR COVER
 "GRASS"                    C        1.16      0.25      1.000    97
 NATURAL POOR COVER
 "GRASS"                    D        0.08      0.20      1.000    98
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     11.16
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  11.48
 AVERAGE FLOW DEPTH(FEET) =   0.20   FLOOD WIDTH(FEET) =    6.40
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.58   Tc(MIN.) =   16.08
 SUBAREA AREA(ACRES) =    2.80       SUBAREA RUNOFF(CFS) =    7.28
 EFFECTIVE AREA(ACRES) =    5.60     AREA-AVERAGED Fm(INCH/HR) =   0.26
 AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        5.6         PEAK FLOW RATE(CFS) =      14.64

 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =  0.23   FLOOD WIDTH(FEET) =    6.69
 FLOW VELOCITY(FEET/SEC.) =  12.61   DEPTH*VELOCITY(FT*FT/SEC) =   2.88
 LONGEST FLOWPATH FROM NODE     50.00 TO NODE     53.00 =    1740.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     53.00 TO NODE     16.00 IS CODE =  91
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =    606.00
 DOWNSTREAM NODE ELEVATION(FEET) =    578.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   398.00
 "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
 PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0500
 PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.20000
 MAXIMUM DEPTH(FEET) =   3.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.016
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
```

```
     LAND USE              GROUP   (ACRES)   (INCH/HR)   (DECIMAL)   CN
  NATURAL GOOD COVER
  "WOODLAND"                 A        0.65       0.40       1.000    45
  NATURAL GOOD COVER
  "WOODLAND"                 B        2.13       0.30       1.000    75
  NATURAL GOOD COVER
  "WOODLAND"                 C        1.04       0.25       1.000    87
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     19.30
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.62
  AVERAGE FLOW DEPTH(FEET) =   0.58   FLOOD WIDTH(FEET) =   10.25
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   1.44   Tc(MIN.) =   17.52
  SUBAREA AREA(ACRES) =    3.82       SUBAREA RUNOFF(CFS) =    9.33
  EFFECTIVE AREA(ACRES) =    9.42     AREA-AVERAGED Fm(INCH/HR) =   0.28
  AREA-AVERAGED Fp(INCH/HR) =   0.28  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        9.4         PEAK FLOW RATE(CFS) =      23.20

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.64   FLOOD WIDTH(FEET) =   10.79
  FLOW VELOCITY(FEET/SEC.) =   4.89   DEPTH*VELOCITY(FT*FT/SEC) =   3.12
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     16.00 =    2138.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       23.20   17.52    3.016  0.28( 0.28) 1.00       9.4      50.00
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     16.00 =    2138.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       86.84   10.97    3.945  0.27( 0.27) 1.00      25.9      31.00
      2       97.15   15.84    3.196  0.27( 0.27) 1.00      36.6      10.00
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     16.00 =    2053.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1      106.29   10.97    3.945  0.27( 0.27) 1.00      31.8      31.00
      2      119.50   15.84    3.196  0.27( 0.27) 1.00      45.1      10.00
      3      114.39   17.52    3.016  0.27( 0.27) 1.00      46.0      50.00
    TOTAL AREA(ACRES) =        46.0

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      119.50  Tc(MIN.) =   15.835
  EFFECTIVE AREA(ACRES) =     45.10  AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       46.0
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     16.00 =    2138.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  91
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =    578.00
 DOWNSTREAM NODE ELEVATION(FEET) =    558.83
 CHANNEL LENGTH THRU SUBAREA(FEET) =   466.00
 "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
 PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0500
 PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.20000
 MAXIMUM DEPTH(FEET) =   6.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.060
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "WOODLAND"                 A        1.58      0.40      1.000    45
 NATURAL GOOD COVER
 "WOODLAND"                 B        0.24      0.30      1.000    75
 NATURAL GOOD COVER
 "WOODLAND"                 C        0.63      0.25      1.000    87
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.35
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =    122.49
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.24
 AVERAGE FLOW DEPTH(FEET) =   1.60   FLOOD WIDTH(FEET) =   20.35
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =   1.24   Tc(MIN.) =   17.08
 SUBAREA AREA(ACRES) =    2.45      SUBAREA RUNOFF(CFS) =    5.97
 EFFECTIVE AREA(ACRES) =   47.55     AREA-AVERAGED Fm(INCH/HR) =   0.28
 AREA-AVERAGED Fp(INCH/HR) =   0.28  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       48.5        PEAK FLOW RATE(CFS) =     119.50
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =  1.58   FLOOD WIDTH(FEET) =   20.18
 FLOW VELOCITY(FEET/SEC.) =   6.20   DEPTH*VELOCITY(FT*FT/SEC) =   9.78
 LONGEST FLOWPATH FROM NODE     50.00 TO NODE     17.00 =    2604.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     40.00 TO NODE     41.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   614.00
 ELEVATION DATA: UPSTREAM(FEET) =    681.80  DOWNSTREAM(FEET) =    594.50

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.599
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.487
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "CHAPARRAL,NARROWLEAF"     A        0.33      0.40      1.000    75   13.60
 NATURAL FAIR COVER
```

```
  "CHAPARRAL,NARROWLEAF"     B        0.93      0.30     1.000    89   13.60
  NATURAL FAIR COVER
  "CHAPARRAL,NARROWLEAF"     C        1.30      0.25     1.000    95   13.60
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      7.37
  TOTAL AREA(ACRES) =      2.56   PEAK FLOW RATE(CFS) =      7.37

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     42.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   594.50  DOWNSTREAM(FEET) =   567.10
  FLOW LENGTH(FEET) =   131.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   5.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.03
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.37
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   13.71
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     42.00 =     745.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     42.00 TO NODE     42.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     45.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   322.00
  ELEVATION DATA: UPSTREAM(FEET) =    681.80  DOWNSTREAM(FEET) =    618.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.830
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.200
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "CHAPARRAL,NARROWLEAF"     B        0.20      0.30     1.000    89    9.83
  NATURAL FAIR COVER
  "CHAPARRAL,NARROWLEAF"     C        2.51      0.25     1.000    95    9.83
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      9.63
  TOTAL AREA(ACRES) =      2.71   PEAK FLOW RATE(CFS) =      9.63

****************************************************************************
  FLOW PROCESS FROM NODE     45.00 TO NODE     46.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   615.00  DOWNSTREAM(FEET) =   609.29
  FLOW LENGTH(FEET) =   306.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.16
```

```
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       9.63
 PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =   10.45
 LONGEST FLOWPATH FROM NODE     40.00 TO NODE     46.00 =     628.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     46.00 TO NODE     46.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.45
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.055
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        0.20      0.40      0.100    52
 COMMERCIAL                 B        0.58      0.30      0.100    76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.33
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =     0.78      SUBAREA RUNOFF(CFS) =     2.82
 EFFECTIVE AREA(ACRES) =      3.49   AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.80
 TOTAL AREA(ACRES) =        3.5       PEAK FLOW RATE(CFS) =      12.09

****************************************************************************
 FLOW PROCESS FROM NODE     46.00 TO NODE     47.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   609.29  DOWNSTREAM(FEET) =   571.50
 FLOW LENGTH(FEET) =   168.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  21.92
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      12.09
 PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   10.58
 LONGEST FLOWPATH FROM NODE     40.00 TO NODE     47.00 =     796.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   10.58
 RAINFALL INTENSITY(INCH/HR) =   4.03
 AREA-AVERAGED Fm(INCH/HR) =  0.20
 AREA-AVERAGED Fp(INCH/HR) =  0.26
 AREA-AVERAGED Ap =  0.80
 EFFECTIVE STREAM AREA(ACRES) =       3.49
 TOTAL STREAM AREA(ACRES) =       3.49
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      12.09

****************************************************************************
 FLOW PROCESS FROM NODE     48.00 TO NODE     48.50 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   529.00
 ELEVATION DATA: UPSTREAM(FEET) =    628.80  DOWNSTREAM(FEET) =    582.00
```

```
 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.476
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.050
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL POOR COVER
 "CHAPARRAL,NARROWLEAF"      A        1.10      0.40      1.000    88   10.48
 NATURAL POOR COVER
 "GRASS"                     B        0.49      0.30      1.000    93   10.48
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.37
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =       5.27
 TOTAL AREA(ACRES) =       1.59   PEAK FLOW RATE(CFS) =       5.27

****************************************************************************
 FLOW PROCESS FROM NODE     48.50 TO NODE     47.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   577.00  DOWNSTREAM(FEET) =   571.50
 FLOW LENGTH(FEET) =   132.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.45
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.27
 PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   10.71
 LONGEST FLOWPATH FROM NODE     48.00 TO NODE     47.00 =     661.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.00 TO NODE     47.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   10.71
 RAINFALL INTENSITY(INCH/HR) =   4.00
 AREA-AVERAGED Fm(INCH/HR) =  0.37
 AREA-AVERAGED Fp(INCH/HR) =  0.37
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       1.59
 TOTAL STREAM AREA(ACRES) =       1.59
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.27

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       12.09   10.58    4.026  0.26( 0.20) 0.80       3.5      40.00
     2        5.27   10.71    3.999  0.37( 0.37) 1.00       1.6      48.00

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       17.34   10.58    4.026  0.30( 0.26) 0.86       5.1      40.00
     2       17.27   10.71    3.999  0.30( 0.26) 0.86       5.1      48.00
```

```
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      17.34    Tc(MIN.) =    10.58
 EFFECTIVE AREA(ACRES) =       5.06   AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.86
 TOTAL AREA(ACRES) =        5.1
 LONGEST FLOWPATH FROM NODE     40.00 TO NODE     47.00 =     796.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     47.00 TO NODE     49.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   571.50  DOWNSTREAM(FEET) =   568.38
 FLOW LENGTH(FEET) =   162.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.47
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      17.34
 PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =   10.87
 LONGEST FLOWPATH FROM NODE     40.00 TO NODE     49.00 =     958.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     49.00 TO NODE     49.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.87
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.966
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "CHAPARRAL,NARROWLEAF"      A        1.50      0.40      1.000    75
 NATURAL FAIR COVER
 "CHAPARRAL,NARROWLEAF"      B        0.28      0.30      1.000    89
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.38
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    1.78      SUBAREA RUNOFF(CFS) =    5.74
 EFFECTIVE AREA(ACRES) =      6.84   AREA-AVERAGED Fm(INCH/HR) =  0.29
 AREA-AVERAGED Fp(INCH/HR) =  0.32  AREA-AVERAGED Ap =  0.90
 TOTAL AREA(ACRES) =        6.9       PEAK FLOW RATE(CFS) =      22.64

****************************************************************************
 FLOW PROCESS FROM NODE     49.00 TO NODE     42.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   568.38  DOWNSTREAM(FEET) =   567.10
 FLOW LENGTH(FEET) =    58.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.77
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      22.64
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   10.96
 LONGEST FLOWPATH FROM NODE     40.00 TO NODE     42.00 =    1016.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     42.00 TO NODE     42.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================
```

```
 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity    Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR)  (INCH/HR)           (ACRES)     NODE
     1       22.64   10.96    3.947   0.32( 0.29) 0.90        6.8       40.00
     2       22.54   11.08    3.921   0.32( 0.29) 0.90        6.9       48.00
 LONGEST FLOWPATH FROM NODE     40.00 TO NODE     42.00 =    1016.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity    Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR)  (INCH/HR)           (ACRES)     NODE
     1        7.37   13.71    3.471   0.29( 0.29) 1.00        2.6       40.00
 LONGEST FLOWPATH FROM NODE     40.00 TO NODE     42.00 =     745.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc    Intensity    Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR)  (INCH/HR)           (ACRES)     NODE
     1       29.41   10.96    3.947   0.31( 0.29) 0.92        8.9       40.00
     2       29.34   11.08    3.921   0.31( 0.29) 0.92        8.9       48.00
     3       27.11   13.71    3.471   0.31( 0.29) 0.93        9.4       40.00
   TOTAL AREA(ACRES) =          9.4

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       29.41  Tc(MIN.) =   10.957
 EFFECTIVE AREA(ACRES) =      8.89  AREA-AVERAGED Fm(INCH/HR) =  0.29
 AREA-AVERAGED Fp(INCH/HR) =  0.31  AREA-AVERAGED Ap =  0.92
 TOTAL AREA(ACRES) =         9.4
 LONGEST FLOWPATH FROM NODE     40.00 TO NODE     42.00 =    1016.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     42.00 TO NODE     42.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     42.00 TO NODE     17.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   567.10  DOWNSTREAM(FEET) =   558.83
 FLOW LENGTH(FEET) =    74.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  20.76
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      29.41
 PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   11.02
 LONGEST FLOWPATH FROM NODE     40.00 TO NODE     17.00 =    1090.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity    Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR)  (INCH/HR)           (ACRES)     NODE
     1       29.41   11.02    3.935   0.31( 0.29) 0.92        8.9       40.00
     2       29.34   11.14    3.909   0.31( 0.29) 0.92        8.9       48.00
     3       27.11   13.77    3.462   0.31( 0.29) 0.93        9.4       40.00
 LONGEST FLOWPATH FROM NODE     40.00 TO NODE     17.00 =    1090.00 FEET.
```

```
** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM        Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
 NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
    1       106.29   12.25    3.703  0.28( 0.28) 1.00       34.3       31.00
    2       119.50   17.08    3.060  0.28( 0.28) 1.00       47.5       10.00
    3       114.40   18.78    2.899  0.28( 0.28) 1.00       48.5       50.00
LONGEST FLOWPATH FROM NODE     50.00 TO NODE     17.00 =    2604.00 FEET.

** PEAK FLOW RATE TABLE **
 STREAM        Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
 NUMBER      (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
    1       131.49   11.02    3.935  0.28( 0.28) 0.98       39.7       40.00
    2       131.86   11.14    3.909  0.28( 0.28) 0.98       40.1       48.00
    3       134.70   12.25    3.703  0.28( 0.28) 0.98       43.4       31.00
    4       137.58   13.77    3.462  0.28( 0.28) 0.99       47.9       40.00
    5       143.18   17.08    3.060  0.28( 0.28) 0.99       57.0       10.00
    6       136.70   18.78    2.899  0.28( 0.28) 0.99       57.9       50.00
  TOTAL AREA(ACRES) =        57.9

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) =      143.18  Tc(MIN.) =   17.080
EFFECTIVE AREA(ACRES) =     56.97  AREA-AVERAGED Fm(INCH/HR) =  0.28
AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.99
TOTAL AREA(ACRES) =       57.9
LONGEST FLOWPATH FROM NODE     50.00 TO NODE     17.00 =    2604.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =  12
----------------------------------------------------------------------------
>>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
FLOW PROCESS FROM NODE     17.00 TO NODE     18.00 IS CODE =  31
----------------------------------------------------------------------------
>>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
>>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
ELEVATION DATA: UPSTREAM(FEET) =   558.83  DOWNSTREAM(FEET) =   557.94
FLOW LENGTH(FEET) =   160.00   MANNING'S N =  0.013
DEPTH OF FLOW IN  57.0 INCH PIPE IS  42.9 INCHES
PIPE-FLOW VELOCITY(FEET/SEC.) =  10.00
ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
PIPE-FLOW(CFS) =     143.18
PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =   17.35
LONGEST FLOWPATH FROM NODE     50.00 TO NODE     18.00 =    2764.00 FEET.

****************************************************************************
FLOW PROCESS FROM NODE     18.00 TO NODE     18.00 IS CODE =  81
----------------------------------------------------------------------------
>>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
MAINLINE Tc(MIN.) =   17.35
* 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.033
SUBAREA LOSS RATE DATA(AMC III):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL GOOD COVER
"CHAPARRAL,BROADLEAF"       A        1.71      0.40      1.000    51
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
SUBAREA AREA(ACRES) =    1.71      SUBAREA RUNOFF(CFS) =    4.05
```

```
  EFFECTIVE AREA(ACRES) =     58.68   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =       59.6       PEAK FLOW RATE(CFS) =     145.35
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       59.6  TC(MIN.) =     17.35
  EFFECTIVE AREA(ACRES) =     58.68  AREA-AVERAGED Fm(INCH/HR)=  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap = 0.988
  PEAK FLOW RATE(CFS)    =     145.35

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1      134.10   11.29    3.879  0.29( 0.28) 0.98      41.4      40.00
      2      134.45   11.42    3.855  0.29( 0.28) 0.98      41.8      48.00
      3      137.00   12.52    3.656  0.29( 0.28) 0.98      45.1      31.00
      4      140.25   14.04    3.424  0.29( 0.28) 0.99      49.6      40.00
      5      145.35   17.35    3.033  0.28( 0.28) 0.99      58.7      10.00
      6      139.12   19.05    2.875  0.28( 0.28) 0.99      59.6      50.00
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

EXISTING AREA B

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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            Ver. 13.5  Release Date: 02/06/2007  License ID 1355

                        Analysis prepared by:

                    Fuscoe Engineering, Inc
                16795 Von Karman Suite 100, Irvine Ca 92606


 ************************* DESCRIPTION OF STUDY *************************
* IRWD SITE - AREA B                                                    *
* 100 YEAR EXISTING HYDROLOGY                                           *
* 6/9/08  JEL                                                           *
 ************************************************************************

  FILE NAME: IRWD00B.DAT
  TIME/DATE OF STUDY: 12:04 06/09/2008
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

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

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

**************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     61.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   240.00
  ELEVATION DATA: UPSTREAM(FEET) =    679.70  DOWNSTREAM(FEET) =    673.60

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.675
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.754
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
```

```
  COMMERCIAL                  C        2.04      0.25      0.100    86     5.67
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =     10.52
  TOTAL AREA(ACRES) =      2.04   PEAK FLOW RATE(CFS) =     10.52

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     62.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   673.60  DOWNSTREAM(FEET) =   637.00
  FLOW LENGTH(FEET) =   540.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.20
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.52
  PIPE TRAVEL TIME(MIN.) =   0.63    Tc(MIN.) =    6.31
  LONGEST FLOWPATH FROM NODE     60.00 TO NODE     62.00 =     780.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     62.00 TO NODE     62.50 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
  UPSTREAM NODE ELEVATION(FEET) =    637.00
  DOWNSTREAM NODE ELEVATION(FEET) =    624.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    62.00
  "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
  PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0150
  PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.12500
  MAXIMUM DEPTH(FEET) =   3.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.378
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL POOR COVER
  "GRASS"                    B        0.11      0.30      1.000    93
  NATURAL POOR COVER
  "GRASS"                    C        1.36      0.25      1.000    97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     13.91
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  13.22
  AVERAGE FLOW DEPTH(FEET) =   0.20   FLOOD WIDTH(FEET) =    7.29
  "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.08   Tc(MIN.) =    6.39
  SUBAREA AREA(ACRES) =    1.47       SUBAREA RUNOFF(CFS) =    6.78
  EFFECTIVE AREA(ACRES) =    3.51     AREA-AVERAGED Fm(INCH/HR) =   0.12
  AREA-AVERAGED Fp(INCH/HR) =   0.25  AREA-AVERAGED Ap =   0.48
  TOTAL AREA(ACRES) =        3.5         PEAK FLOW RATE(CFS) =      16.61

  END OF SUBAREA "V" GUTTER HYDRAULICS:
  DEPTH(FEET) =  0.22   FLOOD WIDTH(FEET) =    7.56
  FLOW VELOCITY(FEET/SEC.) =  14.07   DEPTH*VELOCITY(FT*FT/SEC) =   3.10
  LONGEST FLOWPATH FROM NODE     60.00 TO NODE     62.50 =     842.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     62.50 TO NODE     63.00 IS CODE =  91
----------------------------------------------------------------------------
  >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
```

```
 UPSTREAM NODE ELEVATION(FEET) =    624.00
 DOWNSTREAM NODE ELEVATION(FEET) =    613.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   192.00
 "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
 PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0500
 PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.12500
 MAXIMUM DEPTH(FEET) =   3.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.052
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL POOR COVER
 "GRASS"                    B        1.41      0.30      1.000    93
 NATURAL POOR COVER
 "GRASS"                    C        3.92      0.25      1.000    97
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     28.03
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.35
 AVERAGE FLOW DEPTH(FEET) =   0.69   FLOOD WIDTH(FEET) =   15.03
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.74   Tc(MIN.) =    7.12
 SUBAREA AREA(ACRES) =    5.33       SUBAREA RUNOFF(CFS) =   22.97
 EFFECTIVE AREA(ACRES) =    8.84     AREA-AVERAGED Fm(INCH/HR) =   0.21
 AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   0.79
 TOTAL AREA(ACRES) =        8.8         PEAK FLOW RATE(CFS) =      38.55

 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =  0.79   FLOOD WIDTH(FEET) =   16.75
 FLOW VELOCITY(FEET/SEC.) =   4.72   DEPTH*VELOCITY(FT*FT/SEC) =   3.75
 LONGEST FLOWPATH FROM NODE     60.00 TO NODE     63.00 =    1034.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     63.00 TO NODE     64.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   613.00  DOWNSTREAM(FEET) =   607.80
 FLOW LENGTH(FEET) =   108.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  17.10
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      38.55
 PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    7.23
 LONGEST FLOWPATH FROM NODE     60.00 TO NODE     64.00 =    1142.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     64.00 TO NODE     64.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    7.23
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.009
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL POOR COVER
 "GRASS"                    B        0.01      0.30      1.000    93
 NATURAL POOR COVER
 "GRASS"                    C        0.77      0.25      1.000    97
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    0.78       SUBAREA RUNOFF(CFS) =    3.34
```

```
  EFFECTIVE AREA(ACRES) =      9.62   AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.81
  TOTAL AREA(ACRES) =        9.6       PEAK FLOW RATE(CFS) =      41.55

****************************************************************************
  FLOW PROCESS FROM NODE     64.00 TO NODE     65.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   607.80  DOWNSTREAM(FEET) =   582.15
  FLOW LENGTH(FEET) =   416.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.17
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      41.55
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =    7.59
  LONGEST FLOWPATH FROM NODE     60.00 TO NODE     65.00 =    1558.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     65.00 TO NODE     65.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.59
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.871
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL POOR COVER
  "GRASS"                     B        0.99      0.30      1.000    93
  NATURAL POOR COVER
  "GRASS"                     C        0.30      0.25      1.000    97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.29
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    1.29      SUBAREA RUNOFF(CFS) =    5.32
  EFFECTIVE AREA(ACRES) =     10.91   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.26  AREA-AVERAGED Ap =  0.83
  TOTAL AREA(ACRES) =       10.9       PEAK FLOW RATE(CFS) =      45.67

****************************************************************************
  FLOW PROCESS FROM NODE     65.00 TO NODE     65.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.59
  RAINFALL INTENSITY(INCH/HR) =   4.87
  AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.26
  AREA-AVERAGED Ap =  0.83
  EFFECTIVE STREAM AREA(ACRES) =      10.91
  TOTAL STREAM AREA(ACRES) =      10.91
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      45.67

****************************************************************************
  FLOW PROCESS FROM NODE     70.00 TO NODE     71.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   572.00
```

```
 ELEVATION DATA: UPSTREAM(FEET) =    644.70  DOWNSTREAM(FEET) =    593.80

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   14.518
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.359
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL FAIR COVER
 "GRASS"                    B        1.93      0.30      1.000    86   14.52
 NATURAL FAIR COVER
 "GRASS"                    C        0.97      0.25      1.000    93   14.52
 NATURAL FAIR COVER
 "GRASS"                    D        0.04      0.20      1.000    96   14.52
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      8.14
 TOTAL AREA(ACRES) =      2.94   PEAK FLOW RATE(CFS) =      8.14

****************************************************************************
 FLOW PROCESS FROM NODE     71.00 TO NODE     72.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   589.80  DOWNSTREAM(FEET) =   583.00
 FLOW LENGTH(FEET) =   266.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.25
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       8.14
 PIPE TRAVEL TIME(MIN.) =   0.48    Tc(MIN.) =   15.00
 LONGEST FLOWPATH FROM NODE     70.00 TO NODE     72.00 =     838.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     72.00 TO NODE     72.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   15.00
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.297
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "GRASS"                    A        0.10      0.40      1.000    58
 NATURAL GOOD COVER
 "GRASS"                    B        1.19      0.30      1.000    80
 NATURAL GOOD COVER
 "GRASS"                    C        0.26      0.25      1.000    90
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =     1.55      SUBAREA RUNOFF(CFS) =     4.18
 EFFECTIVE AREA(ACRES) =      4.49   AREA-AVERAGED Fm(INCH/HR) =  0.29
 AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =        4.5       PEAK FLOW RATE(CFS) =      12.16

****************************************************************************
 FLOW PROCESS FROM NODE     72.00 TO NODE     65.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   583.00  DOWNSTREAM(FEET) =   582.15
  FLOW LENGTH(FEET) =   128.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.96
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.16
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =   15.35
  LONGEST FLOWPATH FROM NODE     70.00 TO NODE     65.00 =     966.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     65.00 TO NODE     65.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   15.35
  RAINFALL INTENSITY(INCH/HR) =   3.25
  AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       4.49
  TOTAL STREAM AREA(ACRES) =       4.49
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      12.16

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       45.67    7.59    4.871  0.26( 0.22) 0.83      10.9      60.00
      2       12.16   15.35    3.253  0.29( 0.29) 1.00       4.5      70.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       54.97    7.59    4.871  0.27( 0.23) 0.86      13.1      60.00
      2       41.95   15.35    3.253  0.27( 0.24) 0.88      15.4      70.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      54.97    Tc(MIN.) =     7.59
  EFFECTIVE AREA(ACRES) =      13.13   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.86
  TOTAL AREA(ACRES) =       15.4
  LONGEST FLOWPATH FROM NODE     60.00 TO NODE     65.00 =    1558.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     65.00 TO NODE     66.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   582.15  DOWNSTREAM(FEET) =   563.50
  FLOW LENGTH(FEET) =   278.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.70
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      54.97
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =    7.81
  LONGEST FLOWPATH FROM NODE     60.00 TO NODE     66.00 =    1836.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     66.00 TO NODE     67.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   563.50  DOWNSTREAM(FEET) =   562.00
  FLOW LENGTH(FEET) =   185.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  27.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.41
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      54.97
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =    8.14
  LONGEST FLOWPATH FROM NODE     60.00 TO NODE     67.00 =    2021.00 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =       15.4  TC(MIN.) =      8.14
  EFFECTIVE AREA(ACRES) =     13.13  AREA-AVERAGED Fm(INCH/HR)=  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap = 0.860
  PEAK FLOW RATE(CFS)    =      54.97

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
   NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
      1       54.97    8.14    4.679  0.27( 0.23) 0.86      13.1       60.00
      2       41.95   15.94    3.184  0.27( 0.24) 0.88      15.4       70.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

EXISTING OFFSITE 8

```
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                          Analysis prepared by:

                              Fuscoe Engineering, Inc
                        16795 Von Karman Suite 100, Irvine Ca 92606


 ************************** DESCRIPTION OF STUDY **************************
* IRWD SITE - AREA OFF-SITE 8 TO TRACT 15594                              *
* 100 YEAR EXISTING HYDROLOGY                                            *
* 6/9/08   JEL                                                           *
 **************************************************************************

  FILE NAME: IRW00OS8.DAT
  TIME/DATE OF STUDY: 15:47 06/09/2008
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   8.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  =====  ====  =====  =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   14.0      9.0    0.020/0.020/0.050   0.33    2.00 0.0313 0.100 0.0140

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.33 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************************************************************************
  FLOW PROCESS FROM NODE     90.00 TO NODE     91.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   332.00
  ELEVATION DATA: UPSTREAM(FEET) =    693.40  DOWNSTREAM(FEET) =    625.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.076
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.567
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
```

```
     LAND USE              GROUP   (ACRES)   (INCH/HR)   (DECIMAL)   CN   (MIN.)
  NATURAL GOOD COVER
  "OPEN BRUSH"               C        2.68       0.25       1.000    91    13.08
  NATURAL GOOD COVER
  "OPEN BRUSH"               D        1.62       0.20       1.000    95    13.08
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.23
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     12.91
  TOTAL AREA(ACRES) =      4.30   PEAK FLOW RATE(CFS) =     12.91
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =        4.3  TC(MIN.) =     13.08
  EFFECTIVE AREA(ACRES) =      4.30  AREA-AVERAGED Fm(INCH/HR)=  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.23  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =      12.91
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

EXISTING OFFSITE 9

```
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                        Analysis prepared by:

                        Fuscoe Engineering, Inc
                  16795 Von Karman Suite 100, Irvine Ca 92606


 ************************* DESCRIPTION OF STUDY *************************
* IRWD SITE - AREA OFF-SITE 9 TO OFF-SITE AREA                          *
* 100 YEAR EXISTING HYDROLOGY                                           *
* 6/9/08  JEL                                                           *
 **************************************************************************

  FILE NAME: IRW00OS9.DAT
  TIME/DATE OF STUDY: 15:48 06/09/2008
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   8.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150
  2   14.0      9.0    0.020/0.020/0.050   0.33    2.00 0.0313 0.100 0.0140

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.33 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************************************************************************
  FLOW PROCESS FROM NODE     95.00 TO NODE     96.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   587.00
  ELEVATION DATA: UPSTREAM(FEET) =    700.00  DOWNSTREAM(FEET) =    660.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   20.492
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.757
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
```

```
     LAND USE              GROUP   (ACRES)   (INCH/HR)   (DECIMAL)  CN  (MIN.)
  NATURAL GOOD COVER
  "OPEN BRUSH"               C        2.02       0.25       1.000    91   20.49
  NATURAL GOOD COVER
  "OPEN BRUSH"               D        0.08       0.20       1.000    95   20.49
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      4.74
  TOTAL AREA(ACRES) =      2.10   PEAK FLOW RATE(CFS) =      4.74
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)      =        2.1  TC(MIN.) =     20.49
  EFFECTIVE AREA(ACRES) =      2.10  AREA-AVERAGED Fm(INCH/HR)=  0.25
  AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)    =       4.74
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

RATIONAL PROPOSED AREA A

```
**************************************************************************
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                          Analysis prepared by:

                              Fuscoe Engineering
                    16795 Von Karman Suite 100 Irvine Ca 92606


 ************************** DESCRIPTION OF STUDY **************************
* I.R.W.D. - LAKE FOREST SITE                                             *
* PROPOSED 100 YEAR HYDROLOGY STUDY RESIDENTIAL AREA "A"                  *
* DEVELOPER: LEWIS OPERATING CORP                                         *
 *************************************************************************

  FILE NAME: IRWD100.DAT
  TIME/DATE OF STUDY: 10:46 07/14/2009
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                     --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)     SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  =====  ====  =====  =======
  1   18.0     13.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150

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

**************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   295.00
  ELEVATION DATA: UPSTREAM(FEET) =    692.10  DOWNSTREAM(FEET) =    689.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.998
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.727
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "11+ DWELLINGS/ACRE"       C        1.97      0.25      0.200    86    8.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
  SUBAREA RUNOFF(CFS) =      8.29
  TOTAL AREA(ACRES) =      1.97   PEAK FLOW RATE(CFS) =      8.29
```

```
****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      8.00 IS CODE =  56
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    689.30  DOWNSTREAM(FEET) =    683.80
 CHANNEL LENGTH THRU SUBAREA(FEET) =   320.00   CHANNEL SLOPE =  0.0172
 GIVEN CHANNEL BASE(FEET) =  120.00   CHANNEL FREEBOARD(FEET) =  0.1
 "Z" FACTOR =   0.100   MANNING'S FACTOR = 0.030
 *ESTIMATED CHANNEL HEIGHT(FEET) =   0.22
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.844
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       C        7.10      0.25      0.200    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      20.53
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.53
 AVERAGE FLOW DEPTH(FEET) =   0.11   TRAVEL TIME(MIN.) =   3.48
 Tc(MIN.) =   11.48
 SUBAREA AREA(ACRES) =     7.10      SUBAREA RUNOFF(CFS) =   24.24
 EFFECTIVE AREA(ACRES) =      9.07     AREA-AVERAGED Fm(INCH/HR) =   0.05
 AREA-AVERAGED Fp(INCH/HR) =   0.25  AREA-AVERAGED Ap =   0.20
 TOTAL AREA(ACRES) =        9.1        PEAK FLOW RATE(CFS) =      30.97
 GIVEN CHANNEL BASE(FEET) =  120.00   CHANNEL FREEBOARD(FEET) =  0.1
 "Z" FACTOR =   0.100   MANNING'S FACTOR = 0.030
 *ESTIMATED CHANNEL HEIGHT(FEET) =   0.24

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.14   FLOW VELOCITY(FEET/SEC.) =   1.82
 LONGEST FLOWPATH FROM NODE      6.00 TO NODE      8.00 =     615.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      9.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   676.70  DOWNSTREAM(FEET) =   654.30
 FLOW LENGTH(FEET) =   510.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  14.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.09
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      30.97
 PIPE TRAVEL TIME(MIN.) =   0.56    Tc(MIN.) =   12.04
 LONGEST FLOWPATH FROM NODE      6.00 TO NODE      9.00 =    1125.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   12.04
 RAINFALL INTENSITY(INCH/HR) =   3.74
 AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.20
 EFFECTIVE STREAM AREA(ACRES) =       9.07
 TOTAL STREAM AREA(ACRES) =       9.07
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      30.97
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   186.00
 ELEVATION DATA: UPSTREAM(FEET) =    691.00  DOWNSTREAM(FEET) =    689.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.487
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.330
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       C        0.75      0.25      0.200    86    6.49
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA RUNOFF(CFS) =      3.56
 TOTAL AREA(ACRES) =      0.75   PEAK FLOW RATE(CFS) =      3.56

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    6.49
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.330
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       C        0.98      0.25      0.200    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    0.98      SUBAREA RUNOFF(CFS) =    4.66
 EFFECTIVE AREA(ACRES) =      1.73   AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        1.7       PEAK FLOW RATE(CFS) =       8.22

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE      9.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   654.70  DOWNSTREAM(FEET) =   654.30
 FLOW LENGTH(FEET) =    80.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.77
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       8.22
 PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =    6.77
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE      9.00 =     266.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    6.77
 RAINFALL INTENSITY(INCH/HR) =   5.20
 AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.20
```

```
 EFFECTIVE STREAM AREA(ACRES) =       1.73
 TOTAL STREAM AREA(ACRES) =       1.73
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       8.22

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1       30.97   12.04    3.740  0.25( 0.05) 0.20       9.1       6.00
     2        8.22    6.77    5.202  0.25( 0.05) 0.20       1.7      10.00

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1       32.53    6.77    5.202  0.25( 0.05) 0.20       6.8      10.00
     2       36.85   12.04    3.740  0.25( 0.05) 0.20      10.8       6.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      36.85    Tc(MIN.) =    12.04
 EFFECTIVE AREA(ACRES) =      10.80   AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =       10.8
 LONGEST FLOWPATH FROM NODE      6.00 TO NODE      9.00 =    1125.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 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) =   654.30  DOWNSTREAM(FEET) =   652.00
 FLOW LENGTH(FEET) =   450.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.97
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      36.85
 PIPE TRAVEL TIME(MIN.) =   1.08    Tc(MIN.) =   13.12
 LONGEST FLOWPATH FROM NODE      6.00 TO NODE     13.00 =    1575.00 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.) =   13.12
 RAINFALL INTENSITY(INCH/HR) =   3.56
 AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.20
 EFFECTIVE STREAM AREA(ACRES) =      10.80
 TOTAL STREAM AREA(ACRES) =      10.80
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      36.85

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   279.00
 ELEVATION DATA: UPSTREAM(FEET) =    688.90  DOWNSTREAM(FEET) =    686.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.681
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.838
```

```
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        C        0.98      0.25       0.200    86    7.68
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA RUNOFF(CFS) =      4.22
 TOTAL AREA(ACRES) =      0.98   PEAK FLOW RATE(CFS) =      4.22

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    7.68
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.838
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        C        4.48      0.25       0.200    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    4.48     SUBAREA RUNOFF(CFS) =   19.30
 EFFECTIVE AREA(ACRES) =      5.46   AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        5.5       PEAK FLOW RATE(CFS) =      23.53

****************************************************************************
 FLOW PROCESS FROM NODE     16.00 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) =   676.50  DOWNSTREAM(FEET) =   652.00
 FLOW LENGTH(FEET) =   140.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  23.78
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      23.53
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    7.78
 LONGEST FLOWPATH FROM NODE     14.00 TO NODE     13.00 =     419.00 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.) =    7.78
 RAINFALL INTENSITY(INCH/HR) =   4.80
 AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.20
 EFFECTIVE STREAM AREA(ACRES) =       5.46
 TOTAL STREAM AREA(ACRES) =       5.46
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      23.53

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1       32.53    7.89    4.764  0.25( 0.05) 0.20       6.8      10.00
     1       36.85   13.12    3.560  0.25( 0.05) 0.20      10.8       6.00
     2       23.53    7.78    4.803  0.25( 0.05) 0.20       5.5      14.00
```

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       55.86    7.78    4.803  0.25( 0.05) 0.20      12.2       14.00
     2       55.86    7.89    4.764  0.25( 0.05) 0.20      12.3       10.00
     3       54.23   13.12    3.560  0.25( 0.05) 0.20      16.3        6.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      55.86  Tc(MIN.) =     7.89
 EFFECTIVE AREA(ACRES) =      12.29   AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =       16.3
 LONGEST FLOWPATH FROM NODE      6.00 TO NODE     13.00 =    1575.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE     17.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   652.00  DOWNSTREAM(FEET) =   648.00
 FLOW LENGTH(FEET) =   280.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  25.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.17
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      55.86
 PIPE TRAVEL TIME(MIN.) =   0.42    Tc(MIN.) =    8.31
 LONGEST FLOWPATH FROM NODE      6.00 TO NODE     17.00 =    1855.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    8.31
 RAINFALL INTENSITY(INCH/HR) =   4.62
 AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.20
 EFFECTIVE STREAM AREA(ACRES) =      12.29
 TOTAL STREAM AREA(ACRES) =      16.26
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      55.86

****************************************************************************
 FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   216.00
 ELEVATION DATA: UPSTREAM(FEET) =    667.00  DOWNSTREAM(FEET) =    663.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.796
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.685
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA     Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES) (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                 D        0.37      0.20      0.100    91    5.80
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      1.89
 TOTAL AREA(ACRES) =      0.37   PEAK FLOW RATE(CFS) =      1.89
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     20.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    5.80
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.685
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 D       1.35      0.20      0.100    91
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.20
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    1.35      SUBAREA RUNOFF(CFS) =    6.88
 EFFECTIVE AREA(ACRES) =      1.72   AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        1.7       PEAK FLOW RATE(CFS) =       8.77

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     17.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   654.50  DOWNSTREAM(FEET) =   648.00
 FLOW LENGTH(FEET) =   510.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.88
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       8.77
 PIPE TRAVEL TIME(MIN.) =   1.24    Tc(MIN.) =    7.03
 LONGEST FLOWPATH FROM NODE     18.00 TO NODE     17.00 =     726.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     17.00 TO NODE     17.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    7.03
 RAINFALL INTENSITY(INCH/HR) =   5.09
 AREA-AVERAGED Fm(INCH/HR) =  0.02
 AREA-AVERAGED Fp(INCH/HR) =  0.20
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       1.72
 TOTAL STREAM AREA(ACRES) =       1.72
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       8.77

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1       55.86    8.20    4.661  0.25( 0.05) 0.20      12.2       14.00
     1       55.86    8.31    4.625  0.25( 0.05) 0.20      12.3       10.00
     1       54.23   13.54    3.497  0.25( 0.05) 0.20      16.3        6.00
     2        8.77    7.03    5.089  0.20( 0.02) 0.10       1.7       18.00

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1       61.14    7.03    5.089  0.25( 0.05) 0.19      12.2       18.00
     2       63.89    8.20    4.661  0.25( 0.05) 0.19      13.9       14.00
     3       63.83    8.31    4.625  0.25( 0.05) 0.19      14.0       10.00
     4       60.25   13.54    3.497  0.25( 0.05) 0.19      18.0        6.00
```

```
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      63.89  Tc(MIN.) =     8.20
 EFFECTIVE AREA(ACRES) =      13.91   AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.19
 TOTAL AREA(ACRES) =       18.0
 LONGEST FLOWPATH FROM NODE      6.00 TO NODE     17.00 =    1855.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     17.00 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) =   648.00  DOWNSTREAM(FEET) =   637.70
 FLOW LENGTH(FEET) =   526.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  25.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.06
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      63.89
 PIPE TRAVEL TIME(MIN.) =   0.67    Tc(MIN.) =    8.87
 LONGEST FLOWPATH FROM NODE      6.00 TO NODE     21.00 =    2381.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   223.00
 ELEVATION DATA: UPSTREAM(FEET) =    691.00  DOWNSTREAM(FEET) =    687.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.297
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.421
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        C        0.66      0.25      0.200    86    6.30
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA RUNOFF(CFS) =      3.19
 TOTAL AREA(ACRES) =      0.66   PEAK FLOW RATE(CFS) =      3.19

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    6.30
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.421
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        C        7.32      0.25      0.200    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    7.32      SUBAREA RUNOFF(CFS) =   35.39
 EFFECTIVE AREA(ACRES) =      7.98   AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        8.0       PEAK FLOW RATE(CFS) =      38.58
```

```
****************************************************************************
 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) =   674.00  DOWNSTREAM(FEET) =   639.50
 FLOW LENGTH(FEET) =   160.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  28.60
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      38.58
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    6.39
 LONGEST FLOWPATH FROM NODE     22.00 TO NODE     25.00 =     383.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    6.39
 RAINFALL INTENSITY(INCH/HR) =   5.38
 AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.20
 EFFECTIVE STREAM AREA(ACRES) =       7.98
 TOTAL STREAM AREA(ACRES) =       7.98
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      38.58

****************************************************************************
 FLOW PROCESS FROM NODE     26.00 TO NODE     41.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   264.00
 ELEVATION DATA: UPSTREAM(FEET) =    685.70  DOWNSTREAM(FEET) =    675.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.723
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.726
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       C        0.44      0.25      0.200    86    5.72
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA RUNOFF(CFS) =      2.25
 TOTAL AREA(ACRES) =      0.44   PEAK FLOW RATE(CFS) =      2.25

****************************************************************************
 FLOW PROCESS FROM NODE     41.00 TO NODE     25.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  675.00  DOWNSTREAM ELEVATION(FEET) =  650.00
 STREET LENGTH(FEET) =   760.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  1
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
```

```
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.48
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.34
   HALFSTREET FLOOD WIDTH(FEET) =   10.81
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.25
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.46
 STREET FLOW TRAVEL TIME(MIN.) =   2.98   Tc(MIN.) =    8.70
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.505
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        C        1.60      0.25      0.200    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =     1.60      SUBAREA RUNOFF(CFS) =     6.41
 EFFECTIVE AREA(ACRES) =      2.04    AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        2.0       PEAK FLOW RATE(CFS) =       8.18

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  12.79
 FLOW VELOCITY(FEET/SEC.) =  4.66   DEPTH*VELOCITY(FT*FT/SEC.) =   1.78
 LONGEST FLOWPATH FROM NODE     26.00 TO NODE     25.00 =    1024.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    8.70
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.505
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        C        2.23      0.25      0.200    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =     2.23      SUBAREA RUNOFF(CFS) =     8.94
 EFFECTIVE AREA(ACRES) =      4.27    AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        4.3       PEAK FLOW RATE(CFS) =      17.12

****************************************************************************
 FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    8.70
 RAINFALL INTENSITY(INCH/HR) =   4.50
 AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.20
 EFFECTIVE STREAM AREA(ACRES) =       4.27
 TOTAL STREAM AREA(ACRES) =       4.27
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      17.12

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       38.58    6.39    5.376  0.25( 0.05) 0.20       8.0      22.00
     2       17.12    8.70    4.505  0.25( 0.05) 0.20       4.3      26.00
```

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
     1       53.61    6.39    5.376  0.25( 0.05) 0.20      11.1       22.00
     2       49.39    8.70    4.505  0.25( 0.05) 0.20      12.2       26.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      53.61  Tc(MIN.) =     6.39
 EFFECTIVE AREA(ACRES) =      11.12   AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =       12.2
 LONGEST FLOWPATH FROM NODE     26.00 TO NODE     25.00 =    1024.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     25.00 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) =   639.50  DOWNSTREAM(FEET) =   637.70
 FLOW LENGTH(FEET) =   240.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  26.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.85
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      53.61
 PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =    6.84
 LONGEST FLOWPATH FROM NODE     26.00 TO NODE     21.00 =    1264.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
     1       53.61    6.84    5.170  0.25( 0.05) 0.20      11.1       22.00
     2       49.39    9.17    4.372  0.25( 0.05) 0.20      12.2       26.00
 LONGEST FLOWPATH FROM NODE     26.00 TO NODE     21.00 =    1264.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
     1       61.14    7.71    4.829  0.25( 0.05) 0.19      12.2       18.00
     2       63.89    8.87    4.455  0.25( 0.05) 0.19      13.9       14.00
     3       63.83    8.98    4.424  0.25( 0.05) 0.19      14.0       10.00
     4       60.25   14.21    3.401  0.25( 0.05) 0.19      18.0        6.00
 LONGEST FLOWPATH FROM NODE      6.00 TO NODE     21.00 =    2381.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
     1      111.75    6.84    5.170  0.25( 0.05) 0.19      21.9       22.00
     2      113.18    7.71    4.829  0.25( 0.05) 0.19      23.7       18.00
     3      113.82    8.87    4.455  0.25( 0.05) 0.19      26.0       14.00
     4      113.55    8.98    4.424  0.25( 0.05) 0.19      26.2       10.00
     5      113.08    9.17    4.372  0.25( 0.05) 0.19      26.4       26.00
     6       98.54   14.21    3.401  0.25( 0.05) 0.19      30.2        6.00
   TOTAL AREA(ACRES) =        30.2

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     113.82  Tc(MIN.) =    8.868
 EFFECTIVE AREA(ACRES) =     26.01  AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.19
```

```
 TOTAL AREA(ACRES) =       30.2
 LONGEST FLOWPATH FROM NODE      6.00 TO NODE     21.00 =    2381.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     21.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 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) =   637.70  DOWNSTREAM(FEET) =   636.50
 FLOW LENGTH(FEET) =   160.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  39.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.40
 ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     113.82
 PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =    9.12
 LONGEST FLOWPATH FROM NODE      6.00 TO NODE     26.00 =    2541.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     26.00 TO NODE     26.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    9.12
 RAINFALL INTENSITY(INCH/HR) =   4.38
 AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.19
 EFFECTIVE STREAM AREA(ACRES) =      26.01
 TOTAL STREAM AREA(ACRES) =      30.23
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     113.82

****************************************************************************
 FLOW PROCESS FROM NODE     27.00 TO NODE     28.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   225.00
 ELEVATION DATA: UPSTREAM(FEET) =    658.30  DOWNSTREAM(FEET) =    657.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.926
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.752
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       C        0.49      0.25      0.200    86    7.93
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA RUNOFF(CFS) =      2.07
 TOTAL AREA(ACRES) =      0.49   PEAK FLOW RATE(CFS) =      2.07

****************************************************************************
 FLOW PROCESS FROM NODE     28.00 TO NODE     26.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  657.00  DOWNSTREAM ELEVATION(FEET) =  642.00
```

```
 STREET LENGTH(FEET) =  1020.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.07
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.47
   HALFSTREET FLOOD WIDTH(FEET) =   16.96
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.70
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.72
 STREET FLOW TRAVEL TIME(MIN.) =   4.60   Tc(MIN.) =   12.52
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.656
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       C        5.50      0.25      0.200    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    5.50      SUBAREA RUNOFF(CFS) =   17.85
 EFFECTIVE AREA(ACRES) =      5.99    AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        6.0        PEAK FLOW RATE(CFS) =      19.44

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.49   HALFSTREET FLOOD WIDTH(FEET) =  18.00
 FLOW VELOCITY(FEET/SEC.) =  3.85   DEPTH*VELOCITY(FT*FT/SEC.) =   1.87
 LONGEST FLOWPATH FROM NODE     27.00 TO NODE     26.00 =    1245.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     26.00 TO NODE     26.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   12.52
 RAINFALL INTENSITY(INCH/HR) =   3.66
 AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.20
 EFFECTIVE STREAM AREA(ACRES) =       5.99
 TOTAL STREAM AREA(ACRES) =       5.99
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      19.44

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      111.75    7.10    5.062  0.25( 0.05) 0.19      21.9      22.00
     1      113.18    7.96    4.739  0.25( 0.05) 0.19      23.7      18.00
     1      113.82    9.12    4.383  0.25( 0.05) 0.19      26.0      14.00
     1      113.55    9.24    4.353  0.25( 0.05) 0.19      26.2      10.00
     1      113.08    9.42    4.303  0.25( 0.05) 0.19      26.4      26.00
     1       98.54   14.47    3.365  0.25( 0.05) 0.19      30.2       6.00
     2       19.44   12.52    3.656  0.25( 0.05) 0.20       6.0      27.00

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

```
** PEAK FLOW RATE TABLE **
 STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
 NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
    1      127.07    7.10    5.062  0.25( 0.05) 0.19      25.3      22.00
    2      129.25    7.96    4.739  0.25( 0.05) 0.19      27.5      18.00
    3      130.84    9.12    4.383  0.25( 0.05) 0.19      30.4      14.00
    4      130.66    9.24    4.353  0.25( 0.05) 0.19      30.6      10.00
    5      130.34    9.42    4.303  0.25( 0.05) 0.19      30.9      26.00
    6      123.59   12.52    3.656  0.25( 0.05) 0.20      34.7      27.00
    7      116.41   14.47    3.365  0.25( 0.05) 0.20      36.2       6.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     130.84  Tc(MIN.) =     9.12
 EFFECTIVE AREA(ACRES) =      30.38   AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.19
 TOTAL AREA(ACRES) =       36.2
 LONGEST FLOWPATH FROM NODE      6.00 TO NODE     26.00 =    2541.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     26.00 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) =   636.50  DOWNSTREAM(FEET) =   636.00
 FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  35.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.30
 ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     130.84
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    9.17
 LONGEST FLOWPATH FROM NODE      6.00 TO NODE     29.00 =    2581.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     29.00 TO NODE     29.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    9.17
 RAINFALL INTENSITY(INCH/HR) =   4.37
 AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.19
 EFFECTIVE STREAM AREA(ACRES) =      30.38
 TOTAL STREAM AREA(ACRES) =      36.22
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     130.84

****************************************************************************
 FLOW PROCESS FROM NODE     30.00 TO NODE     31.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   190.00
 ELEVATION DATA: UPSTREAM(FEET) =    672.00  DOWNSTREAM(FEET) =    670.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.570
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.291
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       C        0.40      0.25      0.200    86    6.57
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
```

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 SUBAREA RUNOFF(CFS) =      1.89
 TOTAL AREA(ACRES) =      0.40   PEAK FLOW RATE(CFS) =      1.89

****************************************************************************
 FLOW PROCESS FROM NODE     31.00 TO NODE     32.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  670.00  DOWNSTREAM ELEVATION(FEET) =  652.00
 STREET LENGTH(FEET) =  1770.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  13.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      15.75
   ***STREET FLOW SPLITS OVER STREET-CROWN***
   FULL DEPTH(FEET) =    0.49   FLOOD WIDTH(FEET) =   18.00
   FULL HALF-STREET VELOCITY(FEET/SEC.) =    3.20
   SPLIT DEPTH(FEET) =    0.39   SPLIT FLOOD WIDTH(FEET) =   13.30
   SPLIT FLOW(CFS) =    5.00   SPLIT VELOCITY(FEET/SEC.) =    2.65
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.49
   HALFSTREET FLOOD WIDTH(FEET) =   18.00
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.20
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.56
 STREET FLOW TRAVEL TIME(MIN.) =   9.22   Tc(MIN.) =   15.79
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.201
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        C        9.60      0.25      0.200    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    9.60      SUBAREA RUNOFF(CFS) =   27.23
 EFFECTIVE AREA(ACRES) =     10.00    AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =       10.0        PEAK FLOW RATE(CFS) =      28.36

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.52   HALFSTREET FLOOD WIDTH(FEET) =  18.99
 FLOW VELOCITY(FEET/SEC.) =  3.57   DEPTH*VELOCITY(FT*FT/SEC.) =   1.86
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L = 1770.0 FT WITH ELEVATION-DROP =  18.0 FT, IS   26.9 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE     32.00
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     32.00 =    1960.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     32.00 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) =   644.00  DOWNSTREAM(FEET) =   636.00
 FLOW LENGTH(FEET) =   450.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.49
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      28.36
 PIPE TRAVEL TIME(MIN.) =   0.71    Tc(MIN.) =   16.50
 LONGEST FLOWPATH FROM NODE     30.00 TO NODE     29.00 =    2410.00 FEET.
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     29.00 TO NODE     29.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   16.50
 RAINFALL INTENSITY(INCH/HR) =   3.12
 AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.20
 EFFECTIVE STREAM AREA(ACRES) =      10.00
 TOTAL STREAM AREA(ACRES) =      10.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      28.36

 ** CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1      127.07    7.15    5.041  0.25( 0.05) 0.19      25.3      22.00
     1      129.25    8.01    4.722  0.25( 0.05) 0.19      27.5      18.00
     1      130.84    9.17    4.370  0.25( 0.05) 0.19      30.4      14.00
     1      130.66    9.29    4.339  0.25( 0.05) 0.19      30.6      10.00
     1      130.34    9.47    4.290  0.25( 0.05) 0.19      30.9      26.00
     1      123.59   12.57    3.648  0.25( 0.05) 0.20      34.7      27.00
     1      116.41   14.52    3.359  0.25( 0.05) 0.20      36.2       6.00
     2       28.36   16.50    3.121  0.25( 0.05) 0.20      10.0      30.00

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1      147.03    7.15    5.041  0.25( 0.05) 0.19      29.7      22.00
     2      150.20    8.01    4.722  0.25( 0.05) 0.19      32.4      18.00
     3      153.01    9.17    4.370  0.25( 0.05) 0.20      35.9      14.00
     4      152.95    9.29    4.339  0.25( 0.05) 0.20      36.2      10.00
     5      152.81    9.47    4.290  0.25( 0.05) 0.20      36.6      26.00
     6      148.90   12.57    3.648  0.25( 0.05) 0.20      42.4      27.00
     7      143.30   14.52    3.359  0.25( 0.05) 0.20      45.0       6.00
     8      136.43   16.50    3.121  0.25( 0.05) 0.20      46.2      30.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     153.01  Tc(MIN.) =     9.17
 EFFECTIVE AREA(ACRES) =      35.94   AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =       46.2
 LONGEST FLOWPATH FROM NODE      6.00 TO NODE     29.00 =    2581.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     29.00 TO NODE     42.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   636.00  DOWNSTREAM(FEET) =   610.00
 FLOW LENGTH(FEET) =   400.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  28.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  25.28
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     153.01
 PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =     9.44
 LONGEST FLOWPATH FROM NODE      6.00 TO NODE     42.00 =    2981.00 FEET.
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     42.00 TO NODE     42.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    9.44
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.299
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "CHAPARRAL,BROADLEAF"       C        1.18      0.25      1.000    88
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    1.18      SUBAREA RUNOFF(CFS) =    4.30
 EFFECTIVE AREA(ACRES) =    37.12   AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.22
 TOTAL AREA(ACRES) =      47.4       PEAK FLOW RATE(CFS) =     153.01
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE     42.00 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) =   610.00  DOWNSTREAM(FEET) =   608.50
 FLOW LENGTH(FEET) =   270.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  45.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.04
 ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     153.01
 PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =    9.89
 LONGEST FLOWPATH FROM NODE      6.00 TO NODE     33.00 =    3251.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     34.00 TO NODE     35.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   254.00
 ELEVATION DATA: UPSTREAM(FEET) =    658.70  DOWNSTREAM(FEET) =    656.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.365
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.956
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        C        1.34      0.25      0.200    86    7.36
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA RUNOFF(CFS) =      5.92
 TOTAL AREA(ACRES) =      1.34   PEAK FLOW RATE(CFS) =      5.92
```

AREA C3

```
****************************************************************************
 FLOW PROCESS FROM NODE     35.00 TO NODE     36.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    7.36
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.956
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       C        2.58      0.25      0.200    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    2.58      SUBAREA RUNOFF(CFS) =   11.39
 EFFECTIVE AREA(ACRES) =      3.92   AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        3.9       PEAK FLOW RATE(CFS) =      17.31

****************************************************************************
 FLOW PROCESS FROM NODE     36.00 TO NODE     37.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   645.30  DOWNSTREAM(FEET) =   638.90
 FLOW LENGTH(FEET) =   140.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.12
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      17.31
 PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =    7.54
 LONGEST FLOWPATH FROM NODE     34.00 TO NODE     37.00 =     394.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.00 TO NODE     37.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    7.54
 RAINFALL INTENSITY(INCH/HR) =   4.89
 AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.20
 EFFECTIVE STREAM AREA(ACRES) =       3.92
 TOTAL STREAM AREA(ACRES) =       3.92
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      17.31

****************************************************************************
 FLOW PROCESS FROM NODE     38.00 TO NODE     39.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   132.00
 ELEVATION DATA: UPSTREAM(FEET) =    651.30  DOWNSTREAM(FEET) =    650.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.756
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.708
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"       C        1.08      0.25      0.200    86    5.76
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
```

```
 SUBAREA RUNOFF(CFS) =      5.50
 TOTAL AREA(ACRES) =      1.08   PEAK FLOW RATE(CFS) =      5.50

****************************************************************************
 FLOW PROCESS FROM NODE     39.00 TO NODE     37.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    5.76
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.708
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 RESIDENTIAL
 "11+ DWELLINGS/ACRE"        C        3.24      0.25      0.200    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.200
 SUBAREA AREA(ACRES) =    3.24      SUBAREA RUNOFF(CFS) =   16.50
 EFFECTIVE AREA(ACRES) =      4.32   AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        4.3       PEAK FLOW RATE(CFS) =      22.00

****************************************************************************
 FLOW PROCESS FROM NODE     37.00 TO NODE     37.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    5.76
 RAINFALL INTENSITY(INCH/HR) =   5.71
 AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.20
 EFFECTIVE STREAM AREA(ACRES) =       4.32
 TOTAL STREAM AREA(ACRES) =       4.32
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      22.00

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1       17.31    7.54    4.889  0.25( 0.05) 0.20       3.9      34.00
     2       22.00    5.76    5.708  0.25( 0.05) 0.20       4.3      38.00

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)           (ACRES)    NODE
     1       37.44    5.76    5.708  0.25( 0.05) 0.20       7.3      38.00
     2       36.12    7.54    4.889  0.25( 0.05) 0.20       8.2      34.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      37.44  Tc(MIN.) =     5.76
 EFFECTIVE AREA(ACRES) =       7.31   AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.20
 TOTAL AREA(ACRES) =        8.2
 LONGEST FLOWPATH FROM NODE     34.00 TO NODE     37.00 =     394.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     37.00 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) =   638.90  DOWNSTREAM(FEET) =   608.50
 FLOW LENGTH(FEET) =   146.00   MANNING'S N =  0.013
```

AREA A19

```
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  28.06
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      37.44
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    5.84
 LONGEST FLOWPATH FROM NODE     34.00 TO NODE     33.00 =     540.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       37.44    5.84    5.659  0.25( 0.05) 0.20       7.3      38.00
     2       36.12    7.63    4.856  0.25( 0.05) 0.20       8.2      34.00
 LONGEST FLOWPATH FROM NODE     34.00 TO NODE     33.00 =     540.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      147.03    7.86    4.774  0.25( 0.06) 0.23      30.8      22.00
     2      150.20    8.73    4.497  0.25( 0.06) 0.22      33.6      18.00
     3      153.01    9.89    4.186  0.25( 0.05) 0.22      37.1      14.00
     4      152.95   10.00    4.159  0.25( 0.05) 0.22      37.4      10.00
     5      152.81   10.19    4.115  0.25( 0.05) 0.22      37.8      26.00
     6      148.90   13.29    3.534  0.25( 0.05) 0.22      43.5      27.00
     7      143.30   15.24    3.267  0.25( 0.05) 0.22      46.2       6.00
     8      136.43   17.22    3.046  0.25( 0.05) 0.22      47.4      30.00
 LONGEST FLOWPATH FROM NODE      6.00 TO NODE     33.00 =    3251.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae     HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      167.21    5.84    5.659  0.25( 0.05) 0.22      30.2      38.00
     2      181.31    7.63    4.856  0.25( 0.05) 0.22      38.2      34.00
     3      182.53    7.86    4.774  0.25( 0.05) 0.22      39.1      22.00
     4      183.62    8.73    4.497  0.25( 0.05) 0.22      41.8      18.00
     5      184.10    9.89    4.186  0.25( 0.05) 0.22      45.4      14.00
     6      183.83   10.00    4.159  0.25( 0.05) 0.22      45.6      10.00
     7      183.37   10.19    4.115  0.25( 0.05) 0.22      46.1      26.00
     8      175.09   13.29    3.534  0.25( 0.05) 0.21      51.8      27.00
     9      167.47   15.24    3.267  0.25( 0.05) 0.21      54.4       6.00
    10      158.94   17.22    3.046  0.25( 0.05) 0.21      55.6      30.00
   TOTAL AREA(ACRES) =      55.6

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     184.10 Tc(MIN.) =    9.887
 EFFECTIVE AREA(ACRES) =    45.36  AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.22
 TOTAL AREA(ACRES) =      55.6
 LONGEST FLOWPATH FROM NODE      6.00 TO NODE     33.00 =    3251.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     33.00 TO NODE     40.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   608.50  DOWNSTREAM(FEET) =   590.00
 FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
```

```
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  45.06
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     184.10
 PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    9.91
 LONGEST FLOWPATH FROM NODE      6.00 TO NODE     40.00 =    3321.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    9.91
 RAINFALL INTENSITY(INCH/HR) =   4.18
 AREA-AVERAGED Fm(INCH/HR) =  0.05
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.22
 EFFECTIVE STREAM AREA(ACRES) =      45.36
 TOTAL STREAM AREA(ACRES) =      55.64
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     184.10

****************************************************************************
 FLOW PROCESS FROM NODE     43.00 TO NODE     44.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   365.00
 ELEVATION DATA: UPSTREAM(FEET) =    645.00  DOWNSTREAM(FEET) =    608.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.089
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.125
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                 C        3.24      0.25      0.100    86    5.09
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =     17.79
 TOTAL AREA(ACRES) =      3.24   PEAK FLOW RATE(CFS) =     17.79

****************************************************************************
 FLOW PROCESS FROM NODE     44.00 TO NODE     40.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    5.09
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  6.125
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "GRASS"                    C        4.48      0.25      1.000    90
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    4.48      SUBAREA RUNOFF(CFS) =   23.69
 EFFECTIVE AREA(ACRES) =      7.72   AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.62
 TOTAL AREA(ACRES) =       7.7       PEAK FLOW RATE(CFS) =      41.48
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     40.00 TO NODE     40.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    5.09
 RAINFALL INTENSITY(INCH/HR) =   6.13
 AREA-AVERAGED Fm(INCH/HR) =  0.16
 AREA-AVERAGED Fp(INCH/HR) =  0.25
 AREA-AVERAGED Ap =  0.62
 EFFECTIVE STREAM AREA(ACRES) =       7.72
 TOTAL STREAM AREA(ACRES) =       7.72
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      41.48

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      167.21    5.87    5.645  0.25( 0.05) 0.22      30.2      38.00
     1      181.31    7.66    4.847  0.25( 0.05) 0.22      38.2      34.00
     1      182.53    7.89    4.765  0.25( 0.05) 0.22      39.1      22.00
     1      183.62    8.75    4.489  0.25( 0.05) 0.22      41.8      18.00
     1      184.10    9.91    4.180  0.25( 0.05) 0.22      45.4      14.00
     1      183.83   10.02    4.153  0.25( 0.05) 0.22      45.6      10.00
     1      183.37   10.21    4.109  0.25( 0.05) 0.22      46.1      26.00
     1      175.09   13.31    3.530  0.25( 0.05) 0.21      51.8      27.00
     1      167.47   15.26    3.264  0.25( 0.05) 0.21      54.4       6.00
     1      158.94   17.25    3.043  0.25( 0.05) 0.21      55.6      30.00
     2       41.48    5.09    6.125  0.25( 0.16) 0.62       7.7      43.00

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1      198.93    5.09    6.125  0.25( 0.08) 0.31      33.9      43.00
     2      205.35    5.87    5.645  0.25( 0.08) 0.30      37.9      38.00
     3      213.91    7.66    4.847  0.25( 0.07) 0.29      45.9      34.00
     4      214.56    7.89    4.765  0.25( 0.07) 0.29      46.8      22.00
     5      213.73    8.75    4.489  0.25( 0.07) 0.28      49.5      18.00
     6      212.06    9.91    4.180  0.25( 0.07) 0.28      53.1      14.00
     7      211.61   10.02    4.153  0.25( 0.07) 0.28      53.4      10.00
     8      210.84   10.21    4.109  0.25( 0.07) 0.27      53.8      26.00
     9      198.53   13.31    3.530  0.25( 0.07) 0.27      59.5      27.00
    10      189.07   15.26    3.264  0.25( 0.07) 0.26      62.2       6.00
    11      179.00   17.25    3.043  0.25( 0.07) 0.26      63.4      30.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     214.56  Tc(MIN.) =     7.89
 EFFECTIVE AREA(ACRES) =      46.79   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.29
 TOTAL AREA(ACRES) =       63.4
 LONGEST FLOWPATH FROM NODE      6.00 TO NODE     40.00 =    3321.00 FEET.
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =       63.4  TC(MIN.) =      7.89
 EFFECTIVE AREA(ACRES) =     46.79  AREA-AVERAGED Fm(INCH/HR)=  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap = 0.287
 PEAK FLOW RATE(CFS)    =     214.56
```

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	198.93	5.09	6.125	0.25(0.08)	0.31	33.9	43.00
2	205.35	5.87	5.645	0.25(0.08)	0.30	37.9	38.00
3	213.91	7.66	4.847	0.25(0.07)	0.29	45.9	34.00
4	214.56	7.89	4.765	0.25(0.07)	0.29	46.8	22.00
5	213.73	8.75	4.489	0.25(0.07)	0.28	49.5	18.00
6	212.06	9.91	4.180	0.25(0.07)	0.28	53.1	14.00
7	211.61	10.02	4.153	0.25(0.07)	0.28	53.4	10.00
8	210.84	10.21	4.109	0.25(0.07)	0.27	53.8	26.00
9	198.53	13.31	3.530	0.25(0.07)	0.27	59.5	27.00
10	189.07	15.26	3.264	0.25(0.07)	0.26	62.2	6.00
11	179.00	17.25	3.043	0.25(0.07)	0.26	63.4	30.00

END OF RATIONAL METHOD ANALYSIS

PROPOSED CIVIC CENTER

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
           (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
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             Ver. 13.5  Release Date: 02/06/2007  License ID 1355

                          Analysis prepared by:

                              Fuscoe Engineering
                        16795 Von Karman Suite 100 Irvine Ca 92606


 ************************** DESCRIPTION OF STUDY **************************
* I.R.W.D. - LAKE FOREST SITE                                             *
* PROPOSED 100 YEAR HYDROLOGY STUDY CIVIC CENTER/EXISTING TANK            *
* DEVELOPER: LEWIS OPERATING CORP.                                        *
 *************************************************************************

  FILE NAME: IRW100B.DAT
  TIME/DATE OF STUDY: 10:47 07/14/2009
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) III ASSUMED FOR RATIONAL METHOD*

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

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

**************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     51.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  ELEVATION DATA: UPSTREAM(FEET) =    660.00  DOWNSTREAM(FEET) =    654.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.509
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.319
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        3.03      0.30      0.100    76    6.51
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =     14.42
  TOTAL AREA(ACRES) =      3.03   PEAK FLOW RATE(CFS) =     14.42
```

```
****************************************************************************
 FLOW PROCESS FROM NODE     51.00 TO NODE     52.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    6.51
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.319
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)   (DECIMAL)  CN
 COMMERCIAL                 C        6.18      0.25      0.100    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    6.18      SUBAREA RUNOFF(CFS) =   29.45
 EFFECTIVE AREA(ACRES) =      9.21   AREA-AVERAGED Fm(INCH/HR) =  0.03
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        9.2       PEAK FLOW RATE(CFS) =      43.87

****************************************************************************
 FLOW PROCESS FROM NODE     52.00 TO NODE     53.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   636.80  DOWNSTREAM(FEET) =   573.00
 FLOW LENGTH(FEET) =   200.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  34.40
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      43.87
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    6.61
 LONGEST FLOWPATH FROM NODE     50.00 TO NODE     53.00 =     500.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     53.00 TO NODE     53.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    6.61
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.275
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)   (DECIMAL)  CN
 NATURAL GOOD COVER
 "GRASS"                    C        3.19      0.25      1.000    90
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    3.19      SUBAREA RUNOFF(CFS) =   14.43
 EFFECTIVE AREA(ACRES) =     12.40   AREA-AVERAGED Fm(INCH/HR) =  0.08
 AREA-AVERAGED Fp(INCH/HR) =  0.25  AREA-AVERAGED Ap =  0.33
 TOTAL AREA(ACRES) =       12.4       PEAK FLOW RATE(CFS) =      57.93
```

AREA C2

```
******************************************************************************
 FLOW PROCESS FROM NODE     54.00 TO NODE     55.00 IS CODE =  21
------------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =  1052.00
 ELEVATION DATA: UPSTREAM(FEET) =    638.80  DOWNSTREAM(FEET) =    560.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   25.393
 • 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.438
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL GOOD COVER
 "OPEN BRUSH"              A        2.95      0.40      1.000    61   25.39
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.40
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      5.41
 TOTAL AREA(ACRES) =      2.95   PEAK FLOW RATE(CFS) =      5.41
```

```
******************************************************************************
 FLOW PROCESS FROM NODE     45.00 TO NODE     46.00 IS CODE =  21
------------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   223.00
 ELEVATION DATA: UPSTREAM(FEET) =    628.80  DOWNSTREAM(FEET) =    608.00

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   13.067
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.568
 SUBAREA Tc AND LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL GOOD COVER
 "GRASS"                   B        3.83      0.30      1.000    80   13.07
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =     11.27
 TOTAL AREA(ACRES) =      3.83   PEAK FLOW RATE(CFS) =     11.27
==============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)      =        3.8  TC(MIN.) =     13.07
 EFFECTIVE AREA(ACRES) =      3.83  AREA-AVERAGED Fm(INCH/HR)=  0.30
 AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap = 1.000
 PEAK FLOW RATE(CFS)    =      11.27
==============================================================================
==============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

LOSS RATE AREA A

****
NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
AND LOW LOSS FRACTION ESTIMATIONS

==========

Ver. 14.0 Release Date: 06/01/2007 License ID 1355

Analysis prepared by:

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16795 Von Karman Ave. Suite 100
Irvine, California 92606
PH: 949-474-1960 FAX: 949-474-5315

****

Problem Descriptions:
TENTATIVE TRACT 17331
SERRANO SUMMIT
PROPOSED CONDITION AREA - A

==========

*** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
AND LOW LOSS FRACTION ESTIMATIONS FOR AMC III:

TOTAL 24-HOUR DURATION RAINFALL DEPTH = 5.63 (inches)

SOIL-COVER TYPE	AREA (Acres)	PERCENT OF PERVIOUS AREA	SCS CURVE NUMBER	LOSS RATE Fp(in./hr.)	YIELD
1	67.20	20.00	69	0.025	0.910

TOTAL AREA (Acres) = 67.20

AREA-AVERAGED LOSS RATE, $\overline{Fm}$ (in./hr.) = 0.005

AREA-AVERAGED LOW LOSS FRACTION, $\overline{Y}$ = 0.090

==========

UNIT HYDROGRAPH AREA A

```
**************************************************************************
                    SMALL AREA UNIT HYDROGRAPH MODEL

==========================================================================
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                          Analysis prepared by:

                              Fuscoe Engineering, Inc
                            16795 Von Karman Ave. Suite 100
                                Irvine, California 92606
                          PH: 949-474-1960       FAX: 949-474-5315

**************************************************************************
 ------------------------------------------------------------------------

  Problem Descriptions:
   TENTATIVE TRACT 17331
   SERRANO SUMMIT
   PROPOSED CONDITION AREA - A
 ------------------------------------------------------------------------

     RATIONAL METHOD CALIBRATION COEFFICIENT = 0.75
     TOTAL CATCHMENT AREA(ACRES) =   67.20
     SOIL-LOSS RATE, Fm,(INCH/HR) =  0.005
     LOW LOSS FRACTION = 0.090
     TIME OF CONCENTRATION(MIN.) =  7.89
     SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
     ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
     RETURN FREQUENCY(YEARS) = 100
        5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.52
       30-MINUTE POINT RAINFALL VALUE(INCHES) =  1.09
        1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.45
        3-HOUR   POINT RAINFALL VALUE(INCHES) =  2.43
        6-HOUR   POINT RAINFALL VALUE(INCHES) =  3.36
       24-HOUR   POINT RAINFALL VALUE(INCHES) =  5.63

 ------------------------------------------------------------------------

     TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =    22.97
     TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     8.56

**************************************************************************
   TIME      VOLUME        Q    0.       62.5     125.0     187.5     250.0
  (HOURS)     (AF)       (CFS)
 ------------------------------------------------------------------------
   0.09      0.0152      4.15  Q         .         .         .         .
   0.22      0.0604      4.17  Q         .         .         .         .
   0.35      0.1058      4.20  Q         .         .         .         .
   0.48      0.1515      4.21  Q         .         .         .         .
   0.61      0.1975      4.24  Q         .         .         .         .
   0.75      0.2437      4.26  Q         .         .         .         .
```

0.88	0.2902	4.29	Q	.	.	.	.
1.01	0.3369	4.31	Q	.	.	.	.
1.14	0.3839	4.34	Q	.	.	.	.
1.27	0.4312	4.36	Q	.	.	.	.
1.40	0.4787	4.39	Q	.	.	.	.
1.54	0.5266	4.41	Q	.	.	.	.
1.67	0.5747	4.45	Q	.	.	.	.
1.80	0.6231	4.46	Q	.	.	.	.
1.93	0.6719	4.50	Q	.	.	.	.
2.06	0.7209	4.52	Q	.	.	.	.
2.19	0.7702	4.56	Q	.	.	.	.
2.32	0.8198	4.58	Q	.	.	.	.
2.46	0.8698	4.62	Q	.	.	.	.
2.59	0.9201	4.64	Q	.	.	.	.
2.72	0.9707	4.68	Q	.	.	.	.
2.85	1.0216	4.70	Q	.	.	.	.
2.98	1.0728	4.74	Q	.	.	.	.
3.11	1.1244	4.76	Q	.	.	.	.
3.24	1.1764	4.80	Q	.	.	.	.
3.38	1.2287	4.82	Q	.	.	.	.
3.51	1.2813	4.87	Q	.	.	.	.
3.64	1.3344	4.89	Q	.	.	.	.
3.77	1.3878	4.94	Q	.	.	.	.
3.90	1.4415	4.96	Q	.	.	.	.
4.03	1.4957	5.01	Q	.	.	.	.
4.16	1.5502	5.03	Q	.	.	.	.
4.30	1.6052	5.08	Q	.	.	.	.
4.43	1.6605	5.11	Q	.	.	.	.
4.56	1.7163	5.16	Q	.	.	.	.
4.69	1.7724	5.18	Q	.	.	.	.
4.82	1.8290	5.23	Q	.	.	.	.
4.95	1.8861	5.26	Q	.	.	.	.
5.09	1.9435	5.32	Q	.	.	.	.
5.22	2.0015	5.34	Q	.	.	.	.
5.35	2.0599	5.40	Q	.	.	.	.
5.48	2.1187	5.43	Q	.	.	.	.
5.61	2.1781	5.49	Q	.	.	.	.
5.74	2.2379	5.52	Q	.	.	.	.
5.87	2.2983	5.58	Q	.	.	.	.
6.01	2.3591	5.61	Q	.	.	.	.
6.14	2.4205	5.68	Q	.	.	.	.
6.27	2.4824	5.71	Q	.	.	.	.
6.40	2.5448	5.78	Q	.	.	.	.
6.53	2.6078	5.81	Q	.	.	.	.
6.66	2.6714	5.89	Q	.	.	.	.
6.80	2.7355	5.92	Q	.	.	.	.
6.93	2.8003	6.00	Q	.	.	.	.
7.06	2.8657	6.03	Q	.	.	.	.
7.19	2.9316	6.11	Q	.	.	.	.
7.32	2.9983	6.15	Q	.	.	.	.
7.45	3.0655	6.23	Q	.	.	.	.
7.58	3.1335	6.27	.Q	.	.	.	.
7.72	3.2021	6.36	.Q	.	.	.	.
7.85	3.2715	6.40	.Q	.	.	.	.
7.98	3.3415	6.49	.Q	.	.	.	.
8.11	3.4123	6.54	.Q	.	.	.	.
8.24	3.4839	6.63	.Q	.	.	.	.

8.37	3.5562	6.68	.Q . . . .
8.50	3.6294	6.78	.Q . . . .
8.64	3.7034	6.83	.Q . . . .
8.77	3.7782	6.94	.Q . . . .
8.90	3.8539	6.99	.Q . . . .
9.03	3.9306	7.11	.Q . . . .
9.16	4.0081	7.16	.Q . . . .
9.29	4.0866	7.28	.Q . . . .
9.43	4.1661	7.35	.Q . . . .
9.56	4.2466	7.47	.Q . . . .
9.69	4.3282	7.54	.Q . . . .
9.82	4.4109	7.68	.Q . . . .
9.95	4.4947	7.75	.Q . . . .
10.08	4.5797	7.89	.Q . . . .
10.21	4.6658	7.97	.Q . . . .
10.35	4.7533	8.12	.Q . . . .
10.48	4.8420	8.20	.Q . . . .
10.61	4.9321	8.37	.Q . . . .
10.74	5.0235	8.46	.Q . . . .
10.87	5.1165	8.64	.Q . . . .
11.00	5.2109	8.74	.Q . . . .
11.13	5.3070	8.94	.Q . . . .
11.27	5.4047	9.04	.Q . . . .
11.40	5.5041	9.26	.Q . . . .
11.53	5.6054	9.37	.Q . . . .
11.66	5.7085	9.61	.Q . . . .
11.79	5.8136	9.73	.Q . . . .
11.92	5.9208	10.00	.Q . . . .
12.05	6.0302	10.13	.Q . . . .
12.19	6.1565	13.12	. Q . . . .
12.32	6.3000	13.28	. Q . . . .
12.45	6.4462	13.63	. Q . . . .
12.58	6.5953	13.81	. Q . . . .
12.71	6.7474	14.19	. Q . . . .
12.84	6.9028	14.40	. Q . . . .
12.98	7.0616	14.83	. Q . . . .
13.11	7.2240	15.06	. Q . . . .
13.24	7.3904	15.56	. Q . . . .
13.37	7.5609	15.82	. Q . . . .
13.50	7.7359	16.39	. Q . . . .
13.63	7.9158	16.70	. Q . . . .
13.76	8.1009	17.37	. Q . . . .
13.90	8.2917	17.74	. Q . . . .
14.03	8.4888	18.54	. Q . . . .
14.16	8.6931	19.06	. Q . . . .
14.29	8.9056	20.05	. Q . . . .
14.42	9.1265	20.60	. Q . . . .
14.55	9.3571	21.83	. Q . . . .
14.68	9.5982	22.53	. Q . . . .
14.82	9.8518	24.15	. Q . . . .
14.95	10.1194	25.09	. Q . . . .
15.08	10.4043	27.34	. Q . . . .
15.21	10.7088	28.70	. Q . . . .
15.34	11.0394	32.14	. Q . . . .
15.47	11.3868	31.78	. Q . . . .
15.61	11.7562	36.20	. Q . . . .
15.74	12.1746	40.80	. Q . . . .

15.87	12.7123	58.16	. Q. . . .
16.00	13.4605	79.52	. . Q . . .
16.13	15.1987	240.37	. . . . Q .
16.26	16.7631	47.52	. Q . . . .
16.39	17.1994	32.78	. Q . . . .
16.53	17.5421	30.28	. Q . . . .
16.66	17.8487	26.15	. Q . . . .
16.79	18.1174	23.30	. Q . . . .
16.92	18.3591	21.19	. Q . . . .
17.05	18.5805	19.55	. Q . . . .
17.18	18.7852	18.12	. Q . . . .
17.32	18.9762	17.03	. Q . . . .
17.45	19.1562	16.10	. Q . . . .
17.58	19.3269	15.30	. Q . . . .
17.71	19.4894	14.61	. Q . . . .
17.84	19.6448	14.00	. Q . . . .
17.97	19.7940	13.45	. Q . . . .
18.10	19.9321	11.96	.Q . . . .
18.24	20.0507	9.86	.Q . . . .
18.37	20.1558	9.49	.Q . . . .
18.50	20.2571	9.15	.Q . . . .
18.63	20.3548	8.84	.Q . . . .
18.76	20.4493	8.55	.Q . . . .
18.89	20.5408	8.29	.Q . . . .
19.02	20.6295	8.04	.Q . . . .
19.16	20.7157	7.82	.Q . . . .
19.29	20.7995	7.61	.Q . . . .
19.42	20.8811	7.41	.Q . . . .
19.55	20.9606	7.22	.Q . . . .
19.68	21.0382	7.05	.Q . . . .
19.81	21.1139	6.89	.Q . . . .
19.94	21.1879	6.73	.Q . . . .
20.08	21.2603	6.59	.Q . . . .
20.21	21.3311	6.45	.Q . . . .
20.34	21.4004	6.32	.Q . . . .
20.47	21.4684	6.19	Q . . . .
20.60	21.5350	6.07	Q . . . .
20.73	21.6004	5.96	Q . . . .
20.87	21.6645	5.85	Q . . . .
21.00	21.7276	5.75	Q . . . .
21.13	21.7895	5.65	Q . . . .
21.26	21.8503	5.55	Q . . . .
21.39	21.9101	5.46	Q . . . .
21.52	21.9690	5.37	Q . . . .
21.65	22.0270	5.29	Q . . . .
21.79	22.0840	5.21	Q . . . .
21.92	22.1402	5.13	Q . . . .
22.05	22.1955	5.05	Q . . . .
22.18	22.2501	4.98	Q . . . .
22.31	22.3038	4.91	Q . . . .
22.44	22.3568	4.84	Q . . . .
22.58	22.4091	4.78	Q . . . .
22.71	22.4607	4.72	Q . . . .
22.84	22.5117	4.66	Q . . . .
22.97	22.5619	4.60	Q . . . .
23.10	22.6116	4.54	Q . . . .
23.23	22.6606	4.48	Q . . . .

23.36	22.7090	4.43	Q	.	.	.	.
23.50	22.7569	4.38	Q	.	.	.	.
23.63	22.8042	4.33	Q	.	.	.	.
23.76	22.8509	4.28	Q	.	.	.	.
23.89	22.8971	4.23	Q	.	.	.	.
24.02	22.9428	4.18	Q	.	.	.	.
24.15	22.9655	0.00	Q	.	.	.	.

Summary for Pond 2P: Area A Detentiono Basin

Inflow Area = 67.200 ac, 0.00% Impervious, Inflow Depth = 4.17"
Inflow = 204.19 cfs @ 16.10 hrs, Volume= 23.363 af
Outflow = 133.55 cfs @ 16.19 hrs, Volume= 23.410 af, Atten= 35%, Lag= 5.3 min
Primary = 133.55 cfs @ 16.19 hrs, Volume= 23.410 af

Routing by Stor-Ind method, Time Span= 0.00-26.00 hrs, dt= 0.13 hrs
Peak Elev= 590.60' @ 16.19 hrs Surf.Area= 1.248 ac Storage= 0.735 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1.1 min (835.4 - 834.3)

Volume	Invert	Avail.Storage	Storage Description
#1	590.00'	7.000 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
590.00	1.200	0.000	0.000
591.00	1.280	1.240	1.240
592.00	1.360	1.320	2.560
593.00	1.440	1.400	3.960
594.00	1.520	1.480	5.440
595.00	1.600	1.560	7.000

Device	Routing	Invert	Outlet Devices
#1	Primary	583.00'	**42.0" Round Culvert** L= 400.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 583.00' / 512.00' S= 0.1775 '/' Cc= 0.900 n= 0.013
#2	Primary	590.00'	**48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=127.45 cfs @ 16.19 hrs HW=590.53' (Free Discharge)
└─**1=Culvert** (Inlet Controls 111.41 cfs @ 11.58 fps)
└─**2=Orifice/Grate** (Weir Controls 16.04 cfs @ 2.39 fps)

LOSS RATE CIVIC CENTER

****

NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
AND LOW LOSS FRACTION ESTIMATIONS

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Analysis prepared by:

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Irvine, California 92606
PH: 949-474-1960 FAX: 949-474-5315

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Problem Descriptions:
TENTATIVE TRACT 17331
SERRANO SUMMIT
PROPOSED CONDITION CIVIC CENTER

==========

*** NON-HOMOGENEOUS WATERSHED AREA-AVERAGED LOSS RATE (Fm)
AND LOW LOSS FRACTION ESTIMATIONS FOR AMC III:

TOTAL 24-HOUR DURATION RAINFALL DEPTH = 5.63 (inches)

SOIL-COVER TYPE	AREA (Acres)	PERCENT OF PERVIOUS AREA	SCS CURVE NUMBER	LOSS RATE Fp(in./hr.)	YIELD
1	12.40	12.00	69	0.250	0.929

TOTAL AREA (Acres) = 12.40

AREA-AVERAGED LOSS RATE, $\overline{Fm}$ (in./hr.) = 0.030

AREA-AVERAGED LOW LOSS FRACTION, $\overline{Y}$ = 0.071

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UNIT HYDROGRAPH CIVIC CENTER

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                    SMALL AREA UNIT HYDROGRAPH MODEL

==========================================================================
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                           Analysis prepared by:

                              Fuscoe Engineering, Inc
                            16795 Von Karman Ave. Suite 100
                               Irvine, California 92606
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  Problem Descriptions:
   TENTATIVE TRACT 17331
   SERRANO SUMMIT
   PROPOSED CONDITION CIVIC CENTER
 ------------------------------------------------------------------------


     RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
     TOTAL CATCHMENT AREA(ACRES) =   12.40
     SOIL-LOSS RATE, Fm,(INCH/HR) =  0.030
     LOW LOSS FRACTION = 0.071
     TIME OF CONCENTRATION(MIN.) =  6.61
     SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
     ORANGE COUNTY "VALLEY" RAINFALL VALUES ARE USED
     RETURN FREQUENCY(YEARS) = 100
        5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.52
       30-MINUTE POINT RAINFALL VALUE(INCHES) =  1.09
        1-HOUR   POINT RAINFALL VALUE(INCHES) =  1.45
        3-HOUR   POINT RAINFALL VALUE(INCHES) =  2.43
        6-HOUR   POINT RAINFALL VALUE(INCHES) =  3.36
       24-HOUR   POINT RAINFALL VALUE(INCHES) =  5.63

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     TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     4.90
     TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.92


**************************************************************************
   TIME      VOLUME        Q    0.       15.0      30.0      45.0      60.0
  (HOURS)     (AF)       (CFS)
 ------------------------------------------------------------------------
   0.03      0.0000      0.00  Q         .         .         .         .
   0.14      0.0041      0.91  Q         .         .         .         .
   0.25      0.0124      0.91  Q         .         .         .         .
   0.36      0.0207      0.91  Q         .         .         .         .
   0.47      0.0291      0.92  Q         .         .         .         .
   0.58      0.0375      0.92  Q         .         .         .         .
```

0.69	0.0459	0.93	Q	.	.	.	.
0.80	0.0543	0.93	Q	.	.	.	.
0.91	0.0628	0.94	Q	.	.	.	.
1.02	0.0714	0.94	Q	.	.	.	.
1.13	0.0800	0.95	Q	.	.	.	.
1.24	0.0886	0.95	Q	.	.	.	.
1.35	0.0972	0.95	Q	.	.	.	.
1.46	0.1059	0.96	Q	.	.	.	.
1.57	0.1147	0.96	Q	.	.	.	.
1.68	0.1235	0.97	Q	.	.	.	.
1.79	0.1323	0.97	Q	.	.	.	.
1.90	0.1412	0.98	Q	.	.	.	.
2.01	0.1501	0.98	Q	.	.	.	.
2.12	0.1590	0.99	Q	.	.	.	.
2.23	0.1680	0.99	Q	.	.	.	.
2.34	0.1771	1.00	Q	.	.	.	.
2.45	0.1861	1.00	Q	.	.	.	.
2.56	0.1953	1.01	Q	.	.	.	.
2.67	0.2045	1.01	Q	.	.	.	.
2.78	0.2137	1.02	Q	.	.	.	.
2.89	0.2230	1.02	Q	.	.	.	.
3.00	0.2323	1.03	Q	.	.	.	.
3.11	0.2417	1.03	Q	.	.	.	.
3.22	0.2511	1.04	Q	.	.	.	.
3.33	0.2606	1.04	Q	.	.	.	.
3.44	0.2701	1.05	Q	.	.	.	.
3.55	0.2797	1.06	Q	.	.	.	.
3.66	0.2893	1.06	Q	.	.	.	.
3.77	0.2990	1.07	Q	.	.	.	.
3.88	0.3088	1.07	Q	.	.	.	.
3.99	0.3186	1.08	Q	.	.	.	.
4.10	0.3284	1.08	Q	.	.	.	.
4.21	0.3383	1.09	Q	.	.	.	.
4.32	0.3483	1.10	Q	.	.	.	.
4.43	0.3583	1.11	Q	.	.	.	.
4.54	0.3684	1.11	Q	.	.	.	.
4.65	0.3785	1.12	Q	.	.	.	.
4.76	0.3888	1.12	Q	.	.	.	.
4.87	0.3990	1.13	Q	.	.	.	.
4.98	0.4094	1.14	Q	.	.	.	.
5.09	0.4198	1.15	Q	.	.	.	.
5.20	0.4302	1.15	Q	.	.	.	.
5.31	0.4408	1.16	Q	.	.	.	.
5.42	0.4514	1.17	Q	.	.	.	.
5.53	0.4620	1.18	Q	.	.	.	.
5.64	0.4728	1.18	Q	.	.	.	.
5.75	0.4836	1.19	Q	.	.	.	.
5.86	0.4945	1.20	Q	.	.	.	.
5.97	0.5054	1.21	Q	.	.	.	.
6.08	0.5164	1.21	Q	.	.	.	.
6.20	0.5275	1.23	Q	.	.	.	.
6.31	0.5387	1.23	Q	.	.	.	.
6.42	0.5500	1.24	Q	.	.	.	.
6.53	0.5613	1.25	Q	.	.	.	.
6.64	0.5728	1.26	Q	.	.	.	.
6.75	0.5843	1.27	Q	.	.	.	.
6.86	0.5959	1.28	Q	.	.	.	.

6.97	0.6076	1.29	Q	.	.	.	.
7.08	0.6193	1.30	Q	.	.	.	.
7.19	0.6312	1.31	Q	.	.	.	.
7.30	0.6432	1.32	Q	.	.	.	.
7.41	0.6552	1.33	Q	.	.	.	.
7.52	0.6674	1.34	Q	.	.	.	.
7.63	0.6796	1.35	Q	.	.	.	.
7.74	0.6919	1.36	Q	.	.	.	.
7.85	0.7044	1.37	Q	.	.	.	.
7.96	0.7170	1.39	Q	.	.	.	.
8.07	0.7296	1.39	Q	.	.	.	.
8.18	0.7424	1.41	Q	.	.	.	.
8.29	0.7553	1.42	Q	.	.	.	.
8.40	0.7683	1.44	Q	.	.	.	.
8.51	0.7814	1.44	Q	.	.	.	.
8.62	0.7946	1.46	Q	.	.	.	.
8.73	0.8080	1.47	Q	.	.	.	.
8.84	0.8215	1.49	Q	.	.	.	.
8.95	0.8351	1.50	Q	.	.	.	.
9.06	0.8488	1.52	.Q	.	.	.	.
9.17	0.8627	1.53	.Q	.	.	.	.
9.28	0.8767	1.55	.Q	.	.	.	.
9.39	0.8909	1.56	.Q	.	.	.	.
9.50	0.9052	1.58	.Q	.	.	.	.
9.61	0.9196	1.59	.Q	.	.	.	.
9.72	0.9343	1.62	.Q	.	.	.	.
9.83	0.9490	1.63	.Q	.	.	.	.
9.94	0.9640	1.65	.Q	.	.	.	.
10.05	0.9791	1.67	.Q	.	.	.	.
10.16	0.9944	1.69	.Q	.	.	.	.
10.27	1.0098	1.70	.Q	.	.	.	.
10.38	1.0255	1.73	.Q	.	.	.	.
10.49	1.0413	1.75	.Q	.	.	.	.
10.60	1.0574	1.78	.Q	.	.	.	.
10.71	1.0736	1.79	.Q	.	.	.	.
10.82	1.0900	1.82	.Q	.	.	.	.
10.93	1.1067	1.84	.Q	.	.	.	.
11.04	1.1236	1.87	.Q	.	.	.	.
11.15	1.1407	1.89	.Q	.	.	.	.
11.26	1.1581	1.93	.Q	.	.	.	.
11.37	1.1757	1.94	.Q	.	.	.	.
11.48	1.1936	1.98	.Q	.	.	.	.
11.59	1.2117	2.00	.Q	.	.	.	.
11.70	1.2302	2.05	.Q	.	.	.	.
11.81	1.2489	2.07	.Q	.	.	.	.
11.92	1.2679	2.11	.Q	.	.	.	.
12.03	1.2872	2.14	.Q	.	.	.	.
12.14	1.3094	2.74	.Q	.	.	.	.
12.25	1.3345	2.77	.Q	.	.	.	.
12.36	1.3600	2.83	.Q	.	.	.	.
12.47	1.3858	2.86	.Q	.	.	.	.
12.58	1.4121	2.92	.Q	.	.	.	.
12.70	1.4389	2.95	.Q	.	.	.	.
12.81	1.4661	3.02	. Q	.	.	.	.
12.92	1.4938	3.06	. Q	.	.	.	.
13.03	1.5220	3.14	. Q	.	.	.	.
13.14	1.5507	3.18	. Q	.	.	.	.

13.25	1.5800	3.26	. Q . . . .
13.36	1.6100	3.31	. Q . . . .
13.47	1.6406	3.41	. Q . . . .
13.58	1.6718	3.46	. Q . . . .
13.69	1.7039	3.57	. Q . . . .
13.80	1.7367	3.63	. Q . . . .
13.91	1.7703	3.76	. Q . . . .
14.02	1.8049	3.83	. Q . . . .
14.13	1.8406	4.00	. Q . . . .
14.24	1.8774	4.09	. Q . . . .
14.35	1.9155	4.27	. Q . . . .
14.46	1.9548	4.37	. Q . . . .
14.57	1.9956	4.60	. Q . . . .
14.68	2.0381	4.74	. Q . . . .
14.79	2.0826	5.04	. Q . . . .
14.90	2.1293	5.21	. Q . . . .
15.01	2.1784	5.60	. Q . . . .
15.12	2.2305	5.83	. Q . . . .
15.23	2.2860	6.38	. Q . . . .
15.34	2.3456	6.71	. Q . . . .
15.45	2.4061	6.59	. Q . . . .
15.56	2.4686	7.12	. Q . . . .
15.67	2.5403	8.62	. Q . . . .
15.78	2.6240	9.77	. Q . . . .
15.89	2.7323	14.02	. Q. . . . .
16.00	2.8838	19.26	. . Q . . . .
16.11	3.2391	58.78	. . . . Q.
16.22	3.5586	11.41	. Q . . . .
16.33	3.6459	7.78	. Q . . . .
16.44	3.7133	7.02	. Q . . . .
16.55	3.7730	6.09	. Q . . . .
16.66	3.8252	5.39	. Q . . . .
16.77	3.8720	4.88	. Q . . . .
16.88	3.9146	4.48	. Q . . . .
16.99	3.9540	4.17	. Q . . . .
17.10	3.9908	3.91	. Q . . . .
17.21	4.0254	3.70	. Q . . . .
17.32	4.0583	3.52	. Q . . . .
17.43	4.0896	3.36	. Q . . . .
17.54	4.1195	3.22	. Q . . . .
17.65	4.1483	3.10	. Q . . . .
17.76	4.1760	2.99	.Q . . . .
17.87	4.2027	2.89	.Q . . . .
17.98	4.2286	2.80	.Q . . . .
18.09	4.2523	2.42	.Q . . . .
18.20	4.2728	2.09	.Q . . . .
18.31	4.2916	2.02	.Q . . . .
18.42	4.3097	1.96	.Q . . . .
18.53	4.3273	1.91	.Q . . . .
18.64	4.3445	1.86	.Q . . . .
18.75	4.3611	1.81	.Q . . . .
18.86	4.3774	1.76	.Q . . . .
18.97	4.3932	1.72	.Q . . . .
19.08	4.4087	1.68	.Q . . . .
19.19	4.4238	1.64	.Q . . . .
19.31	4.4386	1.61	.Q . . . .
19.42	4.4530	1.57	.Q . . . .

19.53	4.4672	1.54	.Q	.	.	.	.
19.64	4.4811	1.51	.Q	.	.	.	.
19.75	4.4947	1.48	Q	.	.	.	.
19.86	4.5080	1.45	Q	.	.	.	.
19.97	4.5212	1.43	Q	.	.	.	.
20.08	4.5340	1.40	Q	.	.	.	.
20.19	4.5467	1.38	Q	.	.	.	.
20.30	4.5592	1.36	Q	.	.	.	.
20.41	4.5714	1.33	Q	.	.	.	.
20.52	4.5835	1.31	Q	.	.	.	.
20.63	4.5953	1.29	Q	.	.	.	.
20.74	4.6070	1.27	Q	.	.	.	.
20.85	4.6185	1.26	Q	.	.	.	.
20.96	4.6299	1.24	Q	.	.	.	.
21.07	4.6411	1.22	Q	.	.	.	.
21.18	4.6521	1.20	Q	.	.	.	.
21.29	4.6630	1.19	Q	.	.	.	.
21.40	4.6737	1.17	Q	.	.	.	.
21.51	4.6843	1.16	Q	.	.	.	.
21.62	4.6948	1.14	Q	.	.	.	.
21.73	4.7051	1.13	Q	.	.	.	.
21.84	4.7153	1.11	Q	.	.	.	.
21.95	4.7254	1.10	Q	.	.	.	.
22.06	4.7354	1.09	Q	.	.	.	.
22.17	4.7452	1.08	Q	.	.	.	.
22.28	4.7550	1.06	Q	.	.	.	.
22.39	4.7646	1.05	Q	.	.	.	.
22.50	4.7741	1.04	Q	.	.	.	.
22.61	4.7836	1.03	Q	.	.	.	.
22.72	4.7929	1.02	Q	.	.	.	.
22.83	4.8021	1.01	Q	.	.	.	.
22.94	4.8112	1.00	Q	.	.	.	.
23.05	4.8203	0.99	Q	.	.	.	.
23.16	4.8292	0.98	Q	.	.	.	.
23.27	4.8381	0.97	Q	.	.	.	.
23.38	4.8469	0.96	Q	.	.	.	.
23.49	4.8556	0.95	Q	.	.	.	.
23.60	4.8642	0.94	Q	.	.	.	.
23.71	4.8728	0.93	Q	.	.	.	.
23.82	4.8812	0.93	Q	.	.	.	.
23.93	4.8896	0.92	Q	.	.	.	.
24.04	4.8979	0.91	Q	.	.	.	.
24.15	4.9021	0.00	Q	.	.	.	.

Summary for Pond 2P: Civic Center Detention Basin

Inflow Area = 12.400 ac, 0.00% Impervious, Inflow Depth = 4.79"
Inflow = 52.55 cfs @ 16.16 hrs, Volume= 4.954 af
Outflow = 33.15 cfs @ 16.23 hrs, Volume= 4.945 af, Atten= 37%, Lag= 4.0 min
Primary = 33.15 cfs @ 16.23 hrs, Volume= 4.945 af

Routing by Stor-Ind method, Time Span= 0.00-25.00 hrs, dt= 0.05 hrs
Peak Elev= 576.21' @ 16.23 hrs Surf.Area= 0.158 ac Storage= 0.381 af

Plug-Flow detention time= 14.8 min calculated for 4.945 af (100% of inflow)
Center-of-Mass det. time= 13.7 min (849.6 - 835.9)

Volume	Invert	Avail.Storage	Storage Description
#1	573.00'	0.513 af	**30.00'W x 120.00'L x 4.00'H Prismatoid Z=3.0**

Device	Routing	Invert	Outlet Devices
#1	Primary	573.00'	**30.0" Round Culvert** L= 50.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 573.00' / 571.00' S= 0.0400 '/' Cc= 0.900 n= 0.013

Primary OutFlow Max=32.65 cfs @ 16.23 hrs HW=576.16' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 32.65 cfs @ 6.65 fps)

AREA A EXISTING 2 YEAR HYDROLOGY AND HYDROGRAPH

```
**************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
            (Reference: 1986 ORANGE COUNTY HYDROLOGY CRITERION)
          (c) Copyright 1983-2007 Advanced Engineering Software (aes)
              Ver. 13.5  Release Date: 02/06/2007  License ID 1355

                              Analysis prepared by:

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                                    Irvine, California 92606
                             PH: 949-474-1960       FAX: 949-474-5315

 ************************** DESCRIPTION OF STUDY **************************
* IRWD SITE - AREA A                                                      *
* 2 YEAR EXISTING HYDROLOGY                                               *
*                                                                         *
 *************************************************************************

  FILE NAME: IRWD02A.DAT
  TIME/DATE OF STUDY: 10:18 03/09/2010
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   8.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.85
  *DATA BANK RAINFALL USED*
  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

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

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.33 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

**************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   252.00
  ELEVATION DATA: UPSTREAM(FEET) =    706.50  DOWNSTREAM(FEET) =    688.30
```

```
 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.109
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.715
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL POOR COVER
 "GRASS"                   C        0.55      0.25      1.000    86    8.11
 NATURAL POOR COVER
 "GRASS"                   B        0.22      0.30      1.000    78    8.11
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      1.01
 TOTAL AREA(ACRES) =      0.77   PEAK FLOW RATE(CFS) =      1.01

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  91
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =    688.30
 DOWNSTREAM NODE ELEVATION(FEET) =    658.40
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1247.00
 "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
 PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0500
 PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.07000
 MAXIMUM DEPTH(FEET) =   3.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.081
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL POOR COVER
 "GRASS"                   B        9.28      0.30      1.000    78
 NATURAL POOR COVER
 "GRASS"                   C       18.28      0.25      1.000    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      9.05
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.07
 AVERAGE FLOW DEPTH(FEET) =   0.45   FLOOD WIDTH(FEET) =   16.26
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =  10.02   Tc(MIN.) =   18.13
 SUBAREA AREA(ACRES) =   27.56       SUBAREA RUNOFF(CFS) =   20.19
 EFFECTIVE AREA(ACRES) =   28.33     AREA-AVERAGED Fm(INCH/HR) =   0.27
 AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       28.3        PEAK FLOW RATE(CFS) =      20.75

 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =  0.65   FLOOD WIDTH(FEET) =   21.92
 FLOW VELOCITY(FEET/SEC.) =   2.55   DEPTH*VELOCITY(FT*FT/SEC) =   1.66
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =    1499.00 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) =   643.00  DOWNSTREAM(FEET) =   636.00
 FLOW LENGTH(FEET) =   106.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.76
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      20.75
 PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   18.24
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =    1605.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     30.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   18.24
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.077
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL POOR COVER
 "CHAPARRAL,NARROWLEAF"     B        0.63      0.30     1.000    82
 NATURAL POOR COVER
 "CHAPARRAL,NARROWLEAF"     C        3.06      0.25     1.000    88
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA AREA(ACRES) =    3.69      SUBAREA RUNOFF(CFS) =    2.72
 EFFECTIVE AREA(ACRES) =     32.02   AREA-AVERAGED Fm(INCH/HR) =  0.27
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       32.0       PEAK FLOW RATE(CFS) =      23.37

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE     13.50 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   636.00  DOWNSTREAM(FEET) =   615.00
 FLOW LENGTH(FEET) =   143.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  22.20
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      23.37
 PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   18.35
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.50 =    1748.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     13.50 TO NODE     14.00 IS CODE =  91
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =    615.00
 DOWNSTREAM NODE ELEVATION(FEET) =    596.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   194.00
 "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
 PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0150
 PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.12500
 MAXIMUM DEPTH(FEET) =   3.00
```

```
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.064
SUBAREA LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
NATURAL FAIR COVER
"CHAPARRAL,NARROWLEAF"      A        0.53      0.40      1.000    55
NATURAL FAIR COVER
"CHAPARRAL,NARROWLEAF"      B        1.63      0.30      1.000    72
NATURAL FAIR COVER
"CHAPARRAL,NARROWLEAF"      C        0.03      0.25      1.000    81
SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.32
SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     24.10
TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  12.08
AVERAGE FLOW DEPTH(FEET) =   0.32   FLOOD WIDTH(FEET) =    9.12
"V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.27   Tc(MIN.) =   18.62
SUBAREA AREA(ACRES) =    2.19       SUBAREA RUNOFF(CFS) =    1.46
EFFECTIVE AREA(ACRES) =   34.21     AREA-AVERAGED Fm(INCH/HR) =   0.27
AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
TOTAL AREA(ACRES) =       34.2          PEAK FLOW RATE(CFS) =      24.47

END OF SUBAREA "V" GUTTER HYDRAULICS:
DEPTH(FEET) =  0.32   FLOOD WIDTH(FEET) =    9.17
FLOW VELOCITY(FEET/SEC.) =  12.11   DEPTH*VELOCITY(FT*FT/SEC) =   3.88
LONGEST FLOWPATH FROM NODE     10.00 TO NODE     14.00 =    1942.00 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.) =   18.62
RAINFALL INTENSITY(INCH/HR) =   1.06
AREA-AVERAGED Fm(INCH/HR) =  0.27
AREA-AVERAGED Fp(INCH/HR) =  0.27
AREA-AVERAGED Ap =  1.00
EFFECTIVE STREAM AREA(ACRES) =      34.21
TOTAL STREAM AREA(ACRES) =      34.21
PEAK FLOW RATE(CFS) AT CONFLUENCE =      24.47

****************************************************************************
FLOW PROCESS FROM NODE     31.00 TO NODE     32.00 IS CODE =  21
----------------------------------------------------------------------------
>>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
>>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
INITIAL SUBAREA FLOW-LENGTH(FEET) =   365.00
ELEVATION DATA: UPSTREAM(FEET) =    696.80  DOWNSTREAM(FEET) =    623.00

Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.294
*   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.496
SUBAREA Tc AND LOSS RATE DATA(AMC  II):
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS   Tc
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
```

```
 NATURAL FAIR COVER
 "CHAPARRAL,NARROWLEAF"     B        0.48      0.30     1.000    72   10.29
 NATURAL FAIR COVER
 "CHAPARRAL,NARROWLEAF"     C        1.87      0.25     1.000    81   10.29
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.26
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      2.61
 TOTAL AREA(ACRES) =      2.35   PEAK FLOW RATE(CFS) =      2.61

****************************************************************************
 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) =   618.00  DOWNSTREAM(FEET) =   601.00
 FLOW LENGTH(FEET) =   116.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.85
 ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.61
 PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   10.44
 LONGEST FLOWPATH FROM NODE     31.00 TO NODE     33.00 =     481.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     33.00 TO NODE     14.00 IS CODE =  91
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =    601.00
 DOWNSTREAM NODE ELEVATION(FEET) =    596.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    76.00
 "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
 PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0500
 PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.12500
 MAXIMUM DEPTH(FEET) =   3.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.440
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL FAIR COVER
 "CHAPARRAL,NARROWLEAF"     B        0.01      0.30     1.000    72
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      2.62
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.30
 AVERAGE FLOW DEPTH(FEET) =   0.21   FLOOD WIDTH(FEET) =    7.47
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.55   Tc(MIN.) =   10.99
 SUBAREA AREA(ACRES) =    0.01       SUBAREA RUNOFF(CFS) =    0.01
 EFFECTIVE AREA(ACRES) =    2.36     AREA-AVERAGED Fm(INCH/HR) =   0.26
 AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        2.4         PEAK FLOW RATE(CFS) =       2.61
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =  0.21   FLOOD WIDTH(FEET) =    7.45
 FLOW VELOCITY(FEET/SEC.) =   2.32   DEPTH*VELOCITY(FT*FT/SEC) =   0.49
```

```
 LONGEST FLOWPATH FROM NODE     31.00 TO NODE     14.00 =     557.00 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.) =   10.99
 RAINFALL INTENSITY(INCH/HR) =   1.44
 AREA-AVERAGED Fm(INCH/HR) =  0.26
 AREA-AVERAGED Fp(INCH/HR) =  0.26
 AREA-AVERAGED Ap =  1.00
 EFFECTIVE STREAM AREA(ACRES) =       2.36
 TOTAL STREAM AREA(ACRES) =       2.36
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.61

 ** CONFLUENCE DATA **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1       24.47   18.62    1.064  0.27( 0.27) 1.00       34.2       10.00
     2        2.61   10.99    1.440  0.26( 0.26) 1.00        2.4       31.00

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

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc    Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)           (ACRES)     NODE
     1       23.90   10.99    1.440  0.27( 0.27) 1.00       22.6       31.00
     2       26.26   18.62    1.064  0.27( 0.27) 1.00       36.6       10.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      26.26    Tc(MIN.) =    18.62
 EFFECTIVE AREA(ACRES) =      36.57   AREA-AVERAGED Fm(INCH/HR) =  0.27
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       36.6
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     14.00 =    1942.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   596.00  DOWNSTREAM(FEET) =   590.00
 FLOW LENGTH(FEET) =    82.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  17.58
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      26.26
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   18.69
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     15.00 =    2024.00 FEET.

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 FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  91
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =    590.00
 DOWNSTREAM NODE ELEVATION(FEET) =    578.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =    29.00
 "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
 PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0500
 PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.00200
 MAXIMUM DEPTH(FEET) =   3.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.057
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "WOODLAND"                  B        0.01      0.30     1.000    55
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     26.26
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.23
 AVERAGE FLOW DEPTH(FEET) =   0.18   FLOOD WIDTH(FEET) =  126.30
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.15   Tc(MIN.) =   18.84
 SUBAREA AREA(ACRES) =    0.01       SUBAREA RUNOFF(CFS) =    0.01
 EFFECTIVE AREA(ACRES) =   36.58     AREA-AVERAGED Fm(INCH/HR) =   0.27
 AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =       36.6        PEAK FLOW RATE(CFS) =      26.26
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =  0.18   FLOOD WIDTH(FEET) =  126.30
 FLOW VELOCITY(FEET/SEC.) =   3.23   DEPTH*VELOCITY(FT*FT/SEC) =   0.58
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     16.00 =    2053.00 FEET.

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 FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     50.00 TO NODE     51.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   297.00
 ELEVATION DATA: UPSTREAM(FEET) =    698.30  DOWNSTREAM(FEET) =    693.50

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.683
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.391
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 NATURAL POOR COVER
 "GRASS"                     C        0.30      0.25     1.000    86   11.68
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 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 SUBAREA RUNOFF(CFS) =      0.31
 TOTAL AREA(ACRES) =      0.30   PEAK FLOW RATE(CFS) =      0.31

****************************************************************************
 FLOW PROCESS FROM NODE     51.00 TO NODE     52.00 IS CODE =  91
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =    693.50
 DOWNSTREAM NODE ELEVATION(FEET) =    666.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1046.00
 "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
 PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0150
 PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.20000
 MAXIMUM DEPTH(FEET) =   3.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.095
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL POOR COVER
 "GRASS"                    C        2.50      0.25      1.000    86
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.25
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      1.16
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.89
 AVERAGE FLOW DEPTH(FEET) =   0.10   FLOOD WIDTH(FEET) =    5.44
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =   6.04   Tc(MIN.) =   17.72
 SUBAREA AREA(ACRES) =    2.50       SUBAREA RUNOFF(CFS) =    1.90
 EFFECTIVE AREA(ACRES) =    2.80     AREA-AVERAGED Fm(INCH/HR) =   0.25
 AREA-AVERAGED Fp(INCH/HR) =   0.25  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        2.8         PEAK FLOW RATE(CFS) =       2.13

 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =  0.14   FLOOD WIDTH(FEET) =    5.77
 FLOW VELOCITY(FEET/SEC.) =   3.62   DEPTH*VELOCITY(FT*FT/SEC) =   0.49
 LONGEST FLOWPATH FROM NODE     50.00 TO NODE     52.00 =    1343.00 FEET.

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 FLOW PROCESS FROM NODE     52.00 TO NODE     53.00 IS CODE =  91
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =    666.50
 DOWNSTREAM NODE ELEVATION(FEET) =    606.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   397.00
 "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
 PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0150
 PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.20000
 MAXIMUM DEPTH(FEET) =   3.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.064
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL POOR COVER
 "GRASS"                    A        0.03      0.40      1.000    67
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 NATURAL POOR COVER
 "GRASS"                    B        1.53      0.30     1.000    78
 NATURAL POOR COVER
 "GRASS"                    C        1.16      0.25     1.000    86
 NATURAL POOR COVER
 "GRASS"                    D        0.08      0.20     1.000    89
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.28
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      3.12
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.31
 AVERAGE FLOW DEPTH(FEET) =   0.11   FLOOD WIDTH(FEET) =    5.48
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =   0.91   Tc(MIN.) =   18.63
 SUBAREA AREA(ACRES) =    2.80       SUBAREA RUNOFF(CFS) =    1.98
 EFFECTIVE AREA(ACRES) =    5.60     AREA-AVERAGED Fm(INCH/HR) =   0.26
 AREA-AVERAGED Fp(INCH/HR) =   0.26  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        5.6         PEAK FLOW RATE(CFS) =       4.03

 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =  0.12   FLOOD WIDTH(FEET) =    5.62
 FLOW VELOCITY(FEET/SEC.) =   7.96   DEPTH*VELOCITY(FT*FT/SEC) =   0.97
 LONGEST FLOWPATH FROM NODE     50.00 TO NODE     53.00 =    1740.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     53.00 TO NODE     16.00 IS CODE =  91
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =    606.00
 DOWNSTREAM NODE ELEVATION(FEET) =    578.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   398.00
 "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
 PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0500
 PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.20000
 MAXIMUM DEPTH(FEET) =   3.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.000
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 NATURAL GOOD COVER
 "WOODLAND"                 A        0.65      0.40     1.000    25
 NATURAL GOOD COVER
 "WOODLAND"                 B        2.13      0.30     1.000    55
 NATURAL GOOD COVER
 "WOODLAND"                 C        1.04      0.25     1.000    70
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.30
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      5.23
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.10
 AVERAGE FLOW DEPTH(FEET) =   0.30   FLOOD WIDTH(FEET) =    7.43
 "V" GUTTER FLOW TRAVEL TIME(MIN.) =   2.14   Tc(MIN.) =   20.77
 SUBAREA AREA(ACRES) =    3.82       SUBAREA RUNOFF(CFS) =    2.39
 EFFECTIVE AREA(ACRES) =    9.42     AREA-AVERAGED Fm(INCH/HR) =   0.28
 AREA-AVERAGED Fp(INCH/HR) =   0.28  AREA-AVERAGED Ap =   1.00
 TOTAL AREA(ACRES) =        9.4         PEAK FLOW RATE(CFS) =       6.10

 END OF SUBAREA "V" GUTTER HYDRAULICS:
 DEPTH(FEET) =  0.33   FLOOD WIDTH(FEET) =    7.68
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 FLOW VELOCITY(FEET/SEC.) =   3.26   DEPTH*VELOCITY(FT*FT/SEC) =   1.07
 LONGEST FLOWPATH FROM NODE     50.00 TO NODE     16.00 =    2138.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
     1        6.10   20.77    1.000  0.28( 0.28) 1.00        9.4       50.00
 LONGEST FLOWPATH FROM NODE     50.00 TO NODE     16.00 =    2138.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
     1       23.90   11.23    1.423  0.27( 0.27) 1.00       22.6       31.00
     2       26.26   18.84    1.057  0.27( 0.27) 1.00       36.6       10.00
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     16.00 =    2053.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)      Ap      Ae      HEADWATER
  NUMBER     (CFS)   (MIN.) (INCH/HR) (INCH/HR)          (ACRES)     NODE
     1       29.14   11.23    1.423  0.27( 0.27) 1.00       27.7       31.00
     2       32.23   18.84    1.057  0.27( 0.27) 1.00       45.1       10.00
     3       30.45   20.77    1.000  0.27( 0.27) 1.00       46.0       50.00
   TOTAL AREA(ACRES) =        46.0

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       32.23  Tc(MIN.) =   18.844
 EFFECTIVE AREA(ACRES) =     45.13  AREA-AVERAGED Fm(INCH/HR) =  0.27
 AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
 TOTAL AREA(ACRES) =       46.0
 LONGEST FLOWPATH FROM NODE     50.00 TO NODE     16.00 =    2138.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  91
----------------------------------------------------------------------------
 >>>>>COMPUTE "V" GUTTER FLOW TRAVEL TIME THRU SUBAREA<<<<<
============================================================================
 UPSTREAM NODE ELEVATION(FEET) =    578.00
 DOWNSTREAM NODE ELEVATION(FEET) =    558.83
 CHANNEL LENGTH THRU SUBAREA(FEET) =   466.00
 "V" GUTTER WIDTH(FEET) =   5.00   GUTTER HIKE(FEET) =  0.050
 PAVEMENT LIP(FEET) =  0.010   MANNING'S N = .0500
 PAVEMENT CROSSFALL(DECIMAL NOTATION) = 0.20000
 MAXIMUM DEPTH(FEET) =   6.00
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.004
 SUBAREA LOSS RATE DATA(AMC  II):
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