November 2019

HYDROLOGY ANALYSIS

For

Tentative Tract 20317

City of Chino Hills

County of San Bernardino

Prepared For:

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ANALYSIS

For

TENTATIVE TRACT 20317

City of Chino Hills
County of San Bernardino, California

Prepared Date: 03/27/2020

PREPARED UNDER THE SUPERVISION OF:

03/27/2020

Jianhua "Gary" Guan, R.C.E. 64519, Exp. 06/30/21 Date:

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SECTION 1

INTRODUCTION

A. PROJECT LOCATION

The project site for the proposed Trumark Homes development (Tentative Tract 20317) is currently a vacant and undeveloped land in the City of Chino Hills. The site has a total area of approximately 129.8 acres. It is bounded by Chino Valley Freeway 71 to the east, existing residential development to the north and mostly undeveloped natural areas to the west and south. See Vicinity Map for details.

The site is currently vacant and undeveloped. Trumark Homes is proposing to construct 159 residential units, recreation center and a tank site on the project site.

B. STUDY PURPOSE

The purpose of this study is to provide a hydrology analysis for the flow rates produced from existing and proposed site for comparison purposes. It also serves as the basis for analyzing and designing proposed and required storm drain drainage facilities. The study also demonstrates the mitigation measures (upstream combined debris/detention basin) to reduce the increased storm runoffs due to the project development to the existing levels. In addition, water quality treatment measures will be proposed to ensure the developed flows to be treated prior to releasing to downstream watercourses.

C. METHODOLOGY

As recommended in the San Bernardino County Hydrology Manual, the rational method was used to calculate the design discharge for the local drainage areas since the watershed area to the proposed storm drain systems is less than 640 acres (one square mile). Typically, the Unit Hydrograph Method would be used for areas greater than 640 acres (one square mile) and basin routing as well as storm volume. Synthetic Unit Hydrograph Method was used to calculate the storm runoff volumes. The Rational Method Calibration Coefficient was used to adjust the peak flow rates to match the peak flow rates generated by the Rational Method

Hydrologic calculations to determine the 2-year, 25-year, 25-year and 100-year discharges at critical locations throughout the project site were performed using the San Bernardino County Rational Method. A technical description of the rational method is provided in the San Bernardino Hydrology Manual dated August, 1986. The Rational Method is an empirical computation procedure for developing a peak runoff rate (discharge) for small watersheds for storms of a specified recurrence interval. The rational method equation is based on the assumption that the peak flow rate is directly proportional to the drainage area, rainfall intensity and a loss coefficient which describes the effects of land use and soil type. The design discharges were computed by generating a hydrologic “link-node” model which divides the area into subareas, each tributary to a concentration point or hydrologic “node” point determined by the proposed terrain or street layout.

As described in the San Bernardino County Flood Control District Hydrology Manual, the following procedure was used to develop the design flow rates using the Rational Method:

- Identify the initial area for the tributary area. The initial area must have a tributary area less than 10 acres and an initial flow length of less than 1,000 feet. Routing for the initial tributary area is based on sheet flow. As such, initial flow length in addition to the 1,000 foot limitation should be limited to whence it becomes concentrated.
- Determine the 1-hour rainfall intensity for the required storm event.
- Determine the land use, soil type and the impervious area for the drainage area.
- Define the intensity curve and intensity-duration curve slope on an Intensity-duration Graph in order to determine the rainfall intensity for the corresponding time-of-concentration (TC).

Once these parameters are established, the following formula is used to compute the peak runoff at the corresponding point:

$Q=0.90(I-Fm)A$

Where:

Q=Flow rate in Cubic feet per second

I=Rainfall intensity for the corresponding Tc in inches per hour

Fm=the product of the pervious area and the infiltration rate for the pervious area

A=Surface area of the tributary watershed in acres.

Here are the detailed descriptions for the hydrologic parameters used in the analysis.

Soil type:

Hydrologic soil ratings are based on a scale of A through D, where A is the most pervious, providing the least runoff. Per the soil map from San Bernardino County Hydrology Manual (Figure C-15), the study area consists of soil type B.

1-hour rainfall intensity:

The precipitation data was from the latest NOAA atlas rainfall data, which can be found in this section. The 100-year 1-hour point rainfall for the project site is 1.47 inches with the corresponding 1-hour rainfall intensity of 1.43 inches/hour. The 25-year 1-hour point rainfall for the project site is 1.09 inches and the 2-year 1-hour point rainfall for the project site is 0.552 inches.

Slope of intensity duration curve:

Per San Bernardino County Hydrology Manual (page D-6, see attached), the slope of the intensity duration curve is assumed to be 0.6 for the watersheds in the southwest

portion of the County. For desert and mountain watersheds, the slope of the intensity duration curves is assumed to be 0.7. The project lies within the southwest portion of the county, 0.6 was used as the intensity duration curve in the hydrology analysis.

Antecedent Moisture Condition (AMC):
Per San Bernardino County Hydrology Manual (page C-9,), AMC I was used for 2-year design storm, AMC II was used for 25-year design storm and AMC III was used for 100-year design storm in the hydrology analysis.

The hydrologic calculations were prepared using the Advanced Engineering Software (A.E.S.) Rational Method computer program. The results of the hydrologic calculations were used to design the required storm drain facilities.

D. DISCUSSION

Existing Condition:

Current development in the project site is comprised of vacant and natural with 100% of the surface area is presently pervious.

There are six drainage areas within the studied area in the existing condition. Drainage Areas “A” and “B” contains majority of the project site including the off-site canyon watershed. Drainage Areas “A” and “B” confluence at the downstream of the project property and discharge into the existing 8’x6’ RCB across Freeway 71.

Drainage Areas “C” and “D” are discharging into the existing storm drain systems for Parcel Map No. 10141 improvements. Drainage Area “C” is discharging into the existing 27” storm drain along Coyote Street and Drainage Area “D” is discharging into the existing 42” storm drain at the northeast of the project site. The existing storm drains for Parcel Map No. 10141 joins the existing 8’x6’ RCB that crosses Freeway 71 as well.

Drainage Areas “E” and “F” are discharging into the existing storm drain systems crossing 71 Freeway. Drainage Area “E” is discharging into the existing 72” CSP and Drainage Area “F” is discharging into the existing 24” AP.

Refer to the existing condition hydrology map for the existing drainage facilities and the existing storm drain plans can be found in reference Section 6.

Detailed hydrology calculations and hydrology maps for the existing condition can be found in Section 2 and hydrology calculation results can be found in Table 1.

Proposed Condition:

Trumark Homes is proposing to construct single family residential units, recreation center and a tank site for the project site. The overall storm peak flow rate increases due to the project developments for the 2-year storm, however, the overall peak flow rates reduce for the 25-year and 100-year storms.

In addition to on-site drainage improvements, the proposed project will provide 4 debris basins to contain the debris from the natural areas. The Debris Basin #1 will provide the detention volume in addition to the required debris volumes.

There are five drainage areas in the proposed condition with Drainage Area “A” and “B” discharges into where the existing condition Drainage Area “B” discharge point. The upstream Debris/Detention Basin #1 is provided to reduce the flows to below the existing levels at the existing condition Drainage Area “B” discharge point.

Drainage Areas “C” and “D” are discharging into the existing storm drain systems for Parcel Map No. 10141 improvements. The combined flow rates for Drainage Area “C” and “D” are less than the existing ones per the hydrology calculations because of the drainage area reductions compared with the existing condition. There are no mitigation measurements proposed for Drainage Areas “C” and “D”.

The flow rates for Drainage Areas “E” and “F” are all less than the existing levels due to the drainage area reductions.

The hydrology summary with the comparison with existing conditions is illustrated in Table 1. Please note the proposed condition peak flow rates are the free drain condition without the provided detention basin functions.

The hydrology summary for Drainage Area “C” and “D” is illustrated in Table 2 as Drainage Area “C” and “D” are discharging into one existing storm drain system.

Detailed hydrology calculation and hydrology map for the proposed condition can be found in Section 3.

Table 1 Hydrology Analysis Summary Free Drain Without Detention
Tract 20317 - Shady View
City of Chino Hills

Existing Condition					Proposed Condition					Difference (Proposed-Existing)			
Area	Area (acre)	2-yr (cfs)	25-yr (cfs)	100-yr (cfs)	Area	Area (acre)	2-yr (cfs)	25-yr (cfs)	100-yr (cfs)	Area (acre)	2-yr (cfs)	25-yr (cfs)	100-yr (cfs)
A	32.9	26.4	76.6	109.1	A	-	-	-	-	-32.9	-26.4	-76.6	-109.1
B	222.1	88.6	358.0	535.5	B	260.3	139.0	424.6	625.8	38.2	50.4	66.6	90.3
C	14.2	9.6	31.3	45.1	C	7.8	5.7	17.0	24.5	-6.4	-3.9	-14.3	-20.6
D	17.1	11.3	35.0	50.4	D	21.5	14.6	42.5	62.5	4.4	3.3	7.5	12.1
E	2.8	2.5	6.8	9.6	E	0.8	0.8	2.4	3.5	-2.0	-1.7	-4.4	-6.1
F	2.4	2.1	5.7	8.1	F	1.1	0.4	1.9	2.9	-1.3	-1.7	-3.8	-5.2
Overall	291.5	140.5	513.4	757.8	Overall	291.5	160.5	488.4	719.2	0.0	20.0	-25.0	-38.6

Note:

1. The proposed condition flow rates are free drain condition without detention basin mitigation functions
2. Drainage Area "C" and "D" are draining into the existing storm drain per Parcel Map 10141 improvements.

Table 2 Hydrology Analysis Summary for Areas to Existing PM 10141 Storm Drain
Tract 20317 - Shady View
City of Chino Hills

Existing Condition					Proposed Condition					Difference (Proposed-Existing)			
Area	Area (acre)	2-yr (cfs)	25-yr (cfs)	100-yr (cfs)	Area	Area (acre)	2-yr (cfs)	25-yr (cfs)	100-yr (cfs)	Area (acre)	2-yr (cfs)	25-yr (cfs)	100-yr (cfs)
C	14.2	9.6	31.3	45.1	C	7.8	5.7	17.0	24.5	-6.4	-3.9	-14.3	-20.6
D	17.1	11.3	35.0	50.4	D	21.5	14.6	42.5	62.5	4.4	3.3	7.5	12.1
Overall	31.3	20.9	66.3	95.5	Overall	29.3	20.3	59.5	87.0	-2.0	-0.6	-6.8	-8.5

Unit Hydrograph and Basin Routing Analysis

As shown from Table 1, the flow rates for Drainage Area "B" are all more than the existing condition due to the project developments. The peak flow increase is 50.4 cfs for 2-year storm, 66.6 cfs for 25-year storm and 90.3 cfs for 100-year storm.

Debris/Detention Basin

The Debris/Detention Basin #1 was upsized to provide the detention volumes in addition to the required debris volume. As shown from the debris yield and debris basin sizing calculations in Reference Section 5. The overall volume for Debris/Detention Basin #1 is about 12.08 ac-ft while the bottom 4.09 ac-ft was reserved for the debris volume and the above 7.99 ac-ft was used as the detention volume.

Unit hydrograph and basin routing analysis were performed for the 2-year, 25-year and 100-year storms with the provided basin #1. The detailed unit hydrograph and basin routing calculations including stage-storage-outflow information can be found in the Section 5 and the basin routing summary can be found in Table 3 and summary for the flow rates after the detention basin can be found in Table 4. As shown from Table 4, the proposed detention facilities can mitigate the flow increases due to the project developments below the existing levels for the 2-year, 25-year and 100-year storms.

Table 3 Basin Routing Summary for Tract 20317 in City of Chino Hills

Storm	Inflow	outflow	flow reduction	overall flow increase per Table 1	flow reduction more than flow increase
	(cfs)	(cfs)	(cfs)	(cfs)	
2-year	91.9	34.1	57.8	50.4	yes
25-year	326.8	248.9	77.9	66.6	yes
100-year	480.6	381.1	99.5	90.3	yes

Note: the inflow used in the basin routing analysis was from Node 16

Table 4 Hydrology Analysis Summary
Tract 20317 - Shady View After Detention Basin
City of Chino Hills

Existing Condition					Proposed Condition after Detention					Difference (Proposed-Existing)			
Area	Area (acre)	2-yr (cfs)	25-yr (cfs)	100-yr (cfs)	Area	Area (acre)	2-yr (cfs)	25-yr (cfs)	100-yr (cfs)	Area (acre)	2-yr (cfs)	25-yr (cfs)	100-yr (cfs)
A	32.9	26.4	76.6	109.1	A	0.0	0.0	0.0	0.0	-32.9	-26.4	-76.6	-109.1
B	222.1	82.3	346.6	520.9	B	260.3	81.2	346.7	526.3	38.2	-1.1	0.1	5.4
A and B sub-total	255	108.7	423.2	630	Sub-total	260.3	81.2	346.7	526.3	5.3	-27.5	-76.5	-103.7
C	14.2	11.2	32.1	45.7	C	7.8	5.9	17.3	25.0	-6.4	-5.3	-14.8	-20.7
D	17.1	11.3	35.0	50.4	D	21.5	14.5	42.5	62.5	4.4	3.2	7.5	12.1
C and D sub-total	31.3	22.5	67.1	96.1	Sub-total	29.3	20.4	59.8	87.5	-2.0	-2.1	-7.3	-8.6
E	2.8	2.5	6.8	9.6	E	0.8	0.8	2.4	3.5	-2.0	-1.7	-4.4	-6.1
F	2.4	2.1	5.7	8.1	F	1.1	0.4	1.9	2.9	-1.3	-1.7	-3.8	-5.2
Overall	291.5	135.8	502.8	743.8	Over all	291.5	102.8	410.8	620.2	0.0	-33.0	-92.0	-123.6

Note:

1. The proposed condition flow rates are the flow rates after the detention basin mitigation functions
2. Drainage Area "C" and "D" are draining into the existing storm drain per Parcel Map 10141 improvements.

Water Quality:

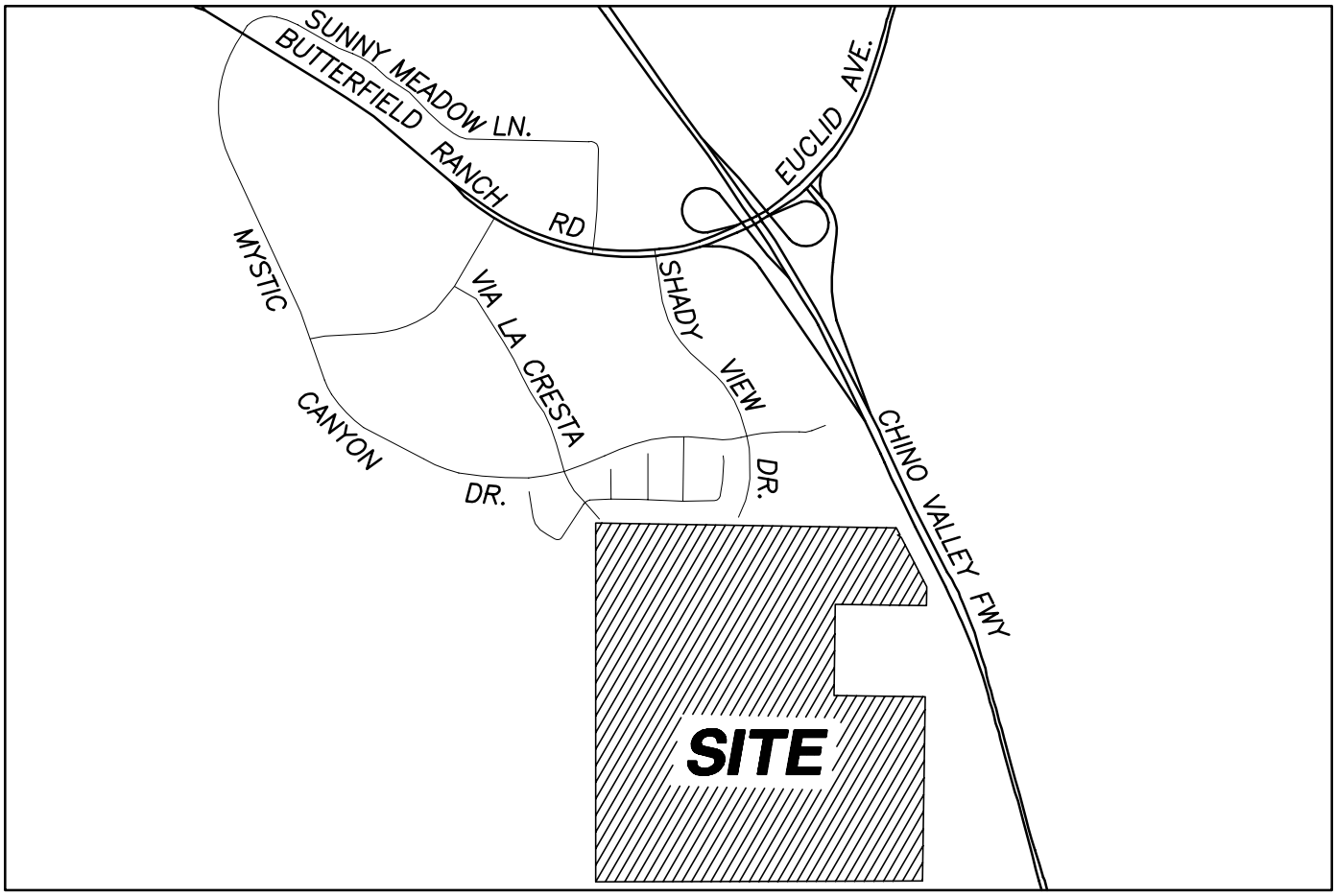
A complete Water Quality Report is present under a separate cover.

E. CONCLUSION

Trumark Homes is proposing to construct 159 residential units, a recreation center and a tank site in the proposed project site which is resulting in the storm runoff volume and peak flow rate increases due to the project developments at certain discharge points. The project proposes the debris basins to contain the debris produced from the upstream natural areas with Debris Basin #1 to be upsized to provide the detention volumes to mitigate the flow increases. The detention facilities is acting as a flow through basin which allows large flows of water to enter but limits the outflow by having a small opening at the basin riser systems.

In addition, water quality treatment measures are proposed to ensure the project water quality flows to be treated prior to releasing to downstream watercourses.

As a result of the project development, it is out opinion that the project would have no adverse impacts to the downstream drainage systems.

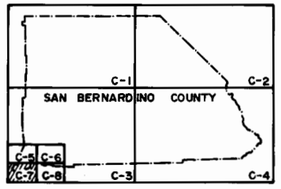


VICINITY MAP

F. HYDROLOGIC DATA

PROJECT SITE
SOIL "B"

SOURCE: 1977 SCS SURVEY



INDEX MAP

LEGEND

SOIL GROUP BOUNDARY

A SOIL GROUP DESIGNATION

BOUNDARY OF INDICATED SOURCE

SCALE 1:48,000

SCALE REDUCED BY 1/2

SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

HYDROLOGIC SOILS GROUP MAP
FOR
SOUTHWEST-C AREA

FIGURE C-15

NOAA Atlas 14, Volume 6, Version 2
Location name: Chino Hills, California, USA*
Latitude: 33.9234°, Longitude: -117.6593°
Elevation: 656.47 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.120 (0.100-0.144)	0.157 (0.131-0.189)	0.207 (0.172-0.251)	0.249 (0.206-0.305)	0.308 (0.246-0.391)	0.355 (0.277-0.460)	0.405 (0.307-0.538)	0.457 (0.337-0.625)	0.530 (0.374-0.758)	0.588 (0.401-0.872)
10-min	0.171 (0.143-0.207)	0.225 (0.188-0.272)	0.297 (0.247-0.360)	0.357 (0.295-0.437)	0.442 (0.352-0.560)	0.509 (0.397-0.660)	0.580 (0.441-0.771)	0.655 (0.483-0.896)	0.759 (0.536-1.09)	0.843 (0.574-1.25)
15-min	0.207 (0.173-0.250)	0.272 (0.227-0.328)	0.359 (0.299-0.435)	0.432 (0.356-0.528)	0.534 (0.426-0.677)	0.616 (0.480-0.798)	0.701 (0.533-0.932)	0.792 (0.584-1.08)	0.918 (0.648-1.31)	1.02 (0.695-1.51)
30-min	0.292 (0.244-0.353)	0.383 (0.320-0.463)	0.506 (0.421-0.614)	0.609 (0.503-0.745)	0.754 (0.601-0.956)	0.869 (0.677-1.13)	0.989 (0.752-1.32)	1.12 (0.824-1.53)	1.30 (0.915-1.85)	1.44 (0.980-2.13)
60-min	0.421 (0.352-0.509)	0.552 (0.461-0.668)	0.729 (0.607-0.884)	0.878 (0.724-1.07)	1.09 (0.866-1.38)	1.25 (0.976-1.62)	1.43 (1.08-1.90)	1.61 (1.19-2.20)	1.87 (1.32-2.67)	2.07 (1.41-3.07)
2-hr	0.633 (0.529-0.764)	0.829 (0.692-1.00)	1.09 (0.909-1.33)	1.31 (1.08-1.61)	1.62 (1.29-2.05)	1.86 (1.45-2.41)	2.12 (1.61-2.81)	2.38 (1.76-3.26)	2.76 (1.95-3.94)	3.06 (2.08-4.53)
3-hr	0.788 (0.659-0.952)	1.03 (0.862-1.25)	1.36 (1.13-1.65)	1.63 (1.35-2.00)	2.01 (1.61-2.55)	2.31 (1.80-3.00)	2.63 (2.00-3.49)	2.96 (2.18-4.05)	3.42 (2.42-4.89)	3.79 (2.58-5.62)
6-hr	1.11 (0.931-1.35)	1.46 (1.22-1.77)	1.93 (1.60-2.34)	2.31 (1.91-2.83)	2.85 (2.27-3.61)	3.27 (2.55-4.24)	3.71 (2.82-4.93)	4.17 (3.08-5.71)	4.81 (3.40-6.88)	5.33 (3.63-7.90)
12-hr	1.47 (1.23-1.77)	1.94 (1.62-2.34)	2.56 (2.13-3.11)	3.08 (2.54-3.77)	3.80 (3.03-4.81)	4.36 (3.40-5.65)	4.94 (3.75-6.56)	5.54 (4.09-7.59)	6.38 (4.51-9.13)	7.04 (4.80-10.4)
24-hr	1.95 (1.72-2.25)	2.60 (2.30-3.00)	3.46 (3.05-4.01)	4.17 (3.65-4.87)	5.16 (4.36-6.22)	5.92 (4.91-7.29)	6.71 (5.43-8.46)	7.53 (5.94-9.75)	8.66 (6.56-11.7)	9.56 (6.99-13.3)
2-day	2.40 (2.12-2.76)	3.24 (2.86-3.74)	4.36 (3.84-5.05)	5.29 (4.62-6.17)	6.58 (5.57-7.93)	7.59 (6.29-9.33)	8.63 (6.99-10.9)	9.72 (7.66-12.6)	11.2 (8.50-15.1)	12.4 (9.10-17.3)
3-day	2.57 (2.27-2.96)	3.51 (3.10-4.05)	4.77 (4.21-5.53)	5.82 (5.09-6.80)	7.29 (6.17-8.78)	8.44 (7.00-10.4)	9.64 (7.80-12.1)	10.9 (8.58-14.1)	12.6 (9.57-17.0)	14.0 (10.3-19.6)
4-day	2.79 (2.47-3.22)	3.83 (3.39-4.43)	5.24 (4.62-6.07)	6.41 (5.60-7.48)	8.04 (6.81-9.70)	9.34 (7.74-11.5)	10.7 (8.65-13.5)	12.1 (9.53-15.7)	14.1 (10.6-19.0)	15.6 (11.4-21.8)
7-day	3.19 (2.82-3.67)	4.38 (3.87-5.05)	5.99 (5.28-6.93)	7.33 (6.41-8.56)	9.22 (7.80-11.1)	10.7 (8.89-13.2)	12.3 (9.94-15.5)	13.9 (11.0-18.0)	16.2 (12.3-21.9)	18.1 (13.2-25.2)
10-day	3.46 (3.06-3.99)	4.76 (4.21-5.50)	6.52 (5.75-7.55)	8.01 (7.00-9.34)	10.1 (8.54-12.2)	11.7 (9.74-14.4)	13.5 (10.9-17.0)	15.3 (12.1-19.8)	17.9 (13.5-24.1)	20.0 (14.6-27.8)
20-day	4.12 (3.64-4.75)	5.70 (5.03-6.58)	7.86 (6.93-9.10)	9.70 (8.48-11.3)	12.3 (10.4-14.9)	14.4 (12.0-17.8)	16.7 (13.5-21.0)	19.1 (15.0-24.7)	22.5 (17.0-30.3)	25.3 (18.5-35.2)
30-day	4.90 (4.33-5.65)	6.79 (6.00-7.84)	9.42 (8.30-10.9)	11.7 (10.2-13.6)	14.9 (12.6-18.0)	17.6 (14.6-21.7)	20.4 (16.5-25.8)	23.5 (18.5-30.4)	27.9 (21.1-37.7)	31.6 (23.1-44.0)
45-day	5.75 (5.09-6.63)	7.97 (7.04-9.21)	11.1 (9.78-12.9)	13.8 (12.1-16.1)	17.8 (15.1-21.5)	21.1 (17.5-25.9)	24.6 (19.9-31.0)	28.5 (22.5-36.9)	34.2 (25.8-46.1)	38.9 (28.4-54.2)
60-day	6.61 (5.85-7.63)	9.15 (8.08-10.6)	12.7 (11.2-14.8)	15.9 (13.9-18.5)	20.5 (17.4-24.7)	24.4 (20.2-30.0)	28.5 (23.1-36.0)	33.1 (26.1-42.9)	39.9 (30.2-53.8)	45.5 (33.3-63.5)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

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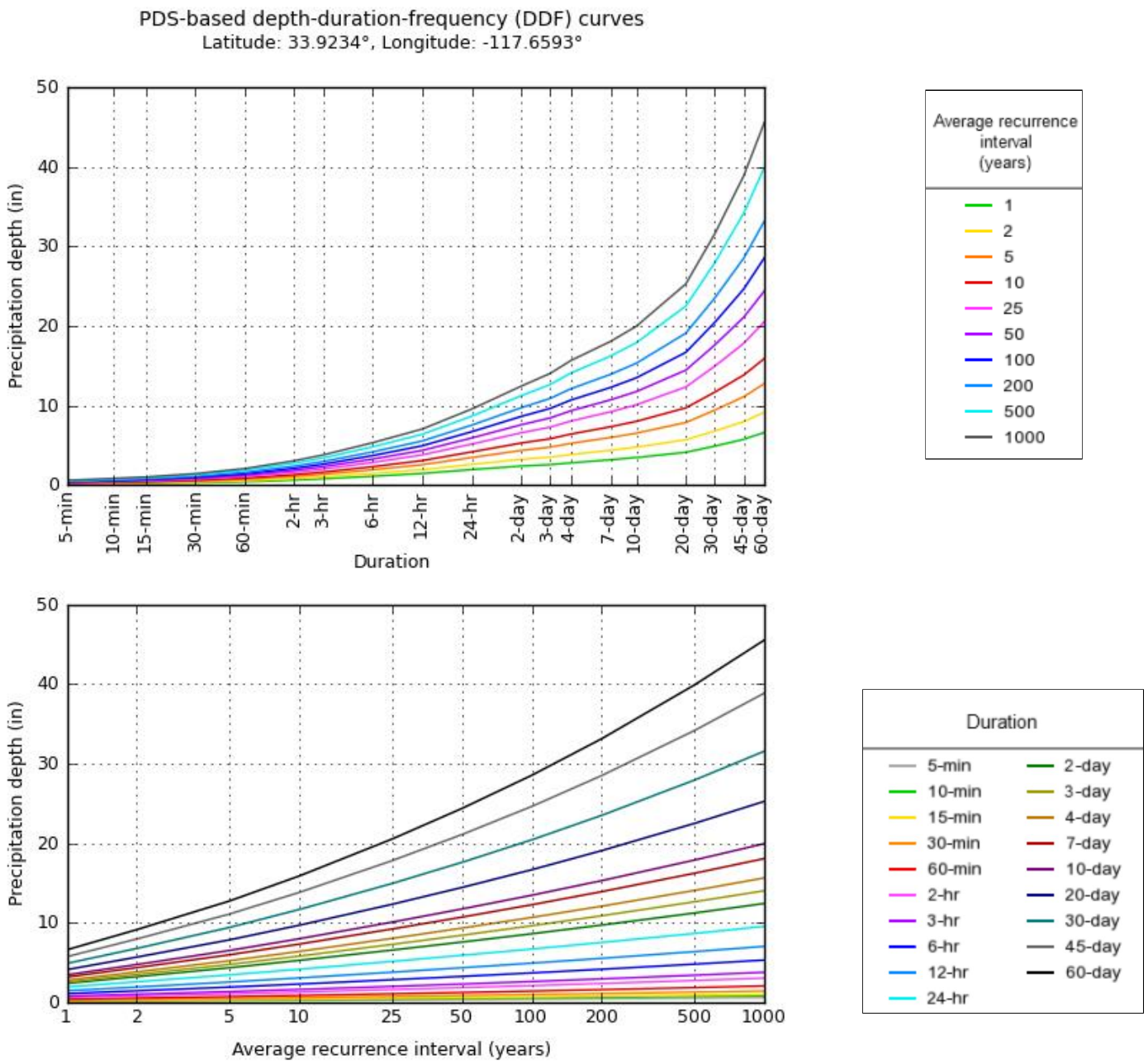
PF graphical



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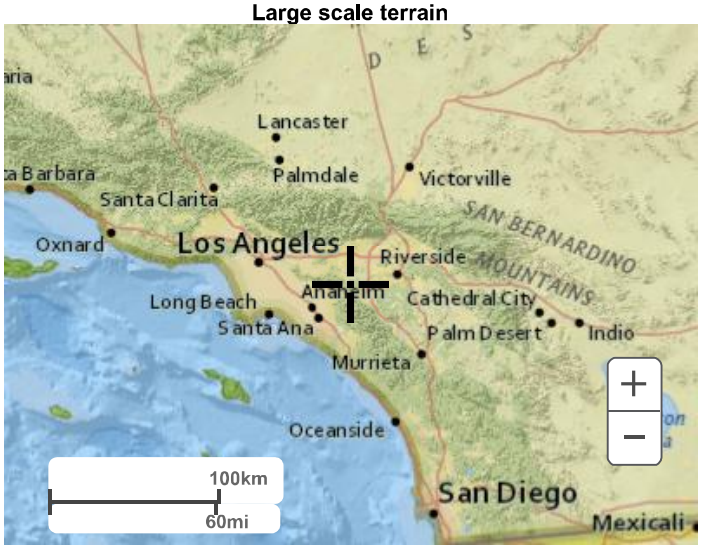
Maps & aerials

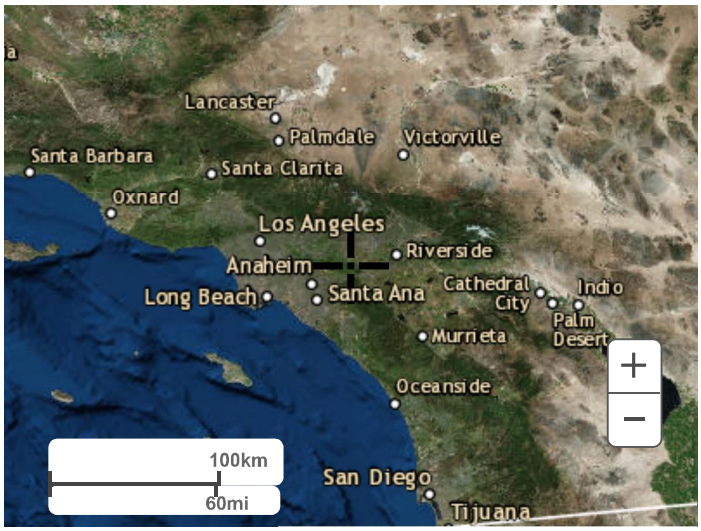
Small scale terrain

Large scale terrain



Large scale map

Large scale aerial



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National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
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Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

SECTION 2

EXISTING CONDITION HYDROLOGY CALCULATIONS

```
____________________________________________________________________________
****************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                           Analysis prepared by:

                           HUNSAKER & ASSOCIATES
                                 Irvine,Inc
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          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* Hydrology Study for VTTM 20317 - Shady View Project                    *
* In the City of Chino Hills, San Bernardino County                      *
* Existing Condition, 2-year Storm                                       *
 ************************************************************************

  FILE NAME: 20317E.DAT
  TIME/DATE OF STUDY: 09:11 03/24/2020
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.5520

  *ANTECEDENT MOISTURE CONDITION (AMC) I 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   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 =  0.50 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) =   850.00
  ELEVATION DATA: UPSTREAM(FEET) =   1060.00  DOWNSTREAM(FEET) =    740.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.479
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.670
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   B        5.70      0.50     1.000    72    9.48
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      5.98
  TOTAL AREA(ACRES) =      5.70   PEAK FLOW RATE(CFS) =      5.98

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    740.00  DOWNSTREAM(FEET) =    613.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00   CHANNEL SLOPE =  0.1270
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       5.98
  FLOW VELOCITY(FEET/SEC) =   6.96 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.39   Tc(MIN.) =   11.87
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =    1850.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.87
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.459
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL POOR COVER
  "BARREN"                   B        9.90      0.50     1.000    72
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    9.90      SUBAREA RUNOFF(CFS) =    8.51
  EFFECTIVE AREA(ACRES) =     15.60   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       15.6       PEAK FLOW RATE(CFS) =      13.41

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
```

```
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    613.00  DOWNSTREAM(FEET) =    575.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   430.00   CHANNEL SLOPE =  0.0884
  CHANNEL FLOW THRU SUBAREA(CFS) =      13.41
  FLOW VELOCITY(FEET/SEC) =   8.01 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.89   Tc(MIN.) =   12.77
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =    2280.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   12.77
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.397
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL POOR COVER
  "BARREN"                   B       17.30      0.50     1.000    72
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   17.30      SUBAREA RUNOFF(CFS) =   13.90
  EFFECTIVE AREA(ACRES) =     32.90   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       32.9       PEAK FLOW RATE(CFS) =      26.44

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   905.00
  ELEVATION DATA: UPSTREAM(FEET) =   1100.00  DOWNSTREAM(FEET) =    965.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.697
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.472
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   B        9.40      0.50     1.000    72   11.70
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      8.19
  TOTAL AREA(ACRES) =      9.40   PEAK FLOW RATE(CFS) =      8.19

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    965.00  DOWNSTREAM(FEET) =    905.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   675.00   CHANNEL SLOPE =  0.0889
  CHANNEL FLOW THRU SUBAREA(CFS) =       8.19
  FLOW VELOCITY(FEET/SEC) =   7.09 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.59   Tc(MIN.) =   13.28
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     22.00 =    1580.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   13.28
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.364
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL POOR COVER
  "BARREN"                   B       17.90      0.50     1.000    72
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   17.90      SUBAREA RUNOFF(CFS) =   13.86
  EFFECTIVE AREA(ACRES) =     27.30   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       27.3       PEAK FLOW RATE(CFS) =      21.13

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    905.00  DOWNSTREAM(FEET) =    804.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1235.00   CHANNEL SLOPE =  0.0818
  CHANNEL FLOW THRU SUBAREA(CFS) =      21.13
  FLOW VELOCITY(FEET/SEC) =   8.70 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.37   Tc(MIN.) =   15.65
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     23.00 =    2815.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   15.65
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.236
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL POOR COVER
  "BARREN"                   B       32.10      0.50     1.000    72
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   32.10      SUBAREA RUNOFF(CFS) =   21.15
  EFFECTIVE AREA(ACRES) =     59.40   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
```

```
  TOTAL AREA(ACRES) =       59.4       PEAK FLOW RATE(CFS) =      39.15

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    804.00  DOWNSTREAM(FEET) =    725.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1325.00   CHANNEL SLOPE =  0.0596
  CHANNEL FLOW THRU SUBAREA(CFS) =      39.15
  FLOW VELOCITY(FEET/SEC) =   8.81 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.51   Tc(MIN.) =   18.16
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     24.00 =    4140.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.16
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.131
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL POOR COVER
  "BARREN"                   B       27.40      0.50     1.000    72
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   27.40      SUBAREA RUNOFF(CFS) =   15.46
  EFFECTIVE AREA(ACRES) =     86.80   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       86.8       PEAK FLOW RATE(CFS) =      48.97

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     25.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    725.00  DOWNSTREAM(FEET) =    704.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   365.00   CHANNEL SLOPE =  0.0575
  CHANNEL FLOW THRU SUBAREA(CFS) =      48.97
  FLOW VELOCITY(FEET/SEC) =   9.23 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.66   Tc(MIN.) =   18.82
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     25.00 =    4505.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.82
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.107
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL POOR COVER
  "BARREN"                   B       63.60      0.50     1.000    72
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   63.60      SUBAREA RUNOFF(CFS) =   34.51
  EFFECTIVE AREA(ACRES) =    150.40   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      150.4       PEAK FLOW RATE(CFS) =      81.61

****************************************************************************
  FLOW PROCESS FROM NODE     25.00 TO NODE     26.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    704.00  DOWNSTREAM(FEET) =    645.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1345.00   CHANNEL SLOPE =  0.0439
  CHANNEL FLOW THRU SUBAREA(CFS) =      81.61
  FLOW VELOCITY(FEET/SEC) =   9.36 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.40   Tc(MIN.) =   21.21
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     26.00 =    5850.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     26.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   21.21
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.030
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL POOR COVER
  "BARREN"                   B       32.00      0.50     1.000    72
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   32.00      SUBAREA RUNOFF(CFS) =   15.15
  EFFECTIVE AREA(ACRES) =    182.40   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      182.4       PEAK FLOW RATE(CFS) =      86.36

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     27.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    645.00  DOWNSTREAM(FEET) =    573.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1755.00   CHANNEL SLOPE =  0.0410
  CHANNEL FLOW THRU SUBAREA(CFS) =      86.36
  FLOW VELOCITY(FEET/SEC) =   9.20 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.18   Tc(MIN.) =   24.39
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     27.00 =    7605.00 FEET.

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

```
  FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   24.39
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.947
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL POOR COVER
  "BARREN"                    B       39.70      0.50     1.000    72
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   39.70      SUBAREA RUNOFF(CFS) =   15.84
  EFFECTIVE AREA(ACRES) =    222.10   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      222.1       PEAK FLOW RATE(CFS) =      88.61

****************************************************************************
  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) =   865.00
  ELEVATION DATA: UPSTREAM(FEET) =    830.00  DOWNSTREAM(FEET) =    640.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.632
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.559
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                    B        5.10      0.50     1.000    72   10.63
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      4.84
  TOTAL AREA(ACRES) =      5.10   PEAK FLOW RATE(CFS) =      4.84

****************************************************************************
  FLOW PROCESS FROM NODE     31.00 TO NODE     32.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    640.00  DOWNSTREAM(FEET) =    625.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   435.00   CHANNEL SLOPE =  0.0345
  CHANNEL FLOW THRU SUBAREA(CFS) =       4.84
  FLOW VELOCITY(FEET/SEC) =   3.89 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.86   Tc(MIN.) =   12.50
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     32.00 =    1300.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     32.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.50
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.415
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL POOR COVER
  "BARREN"                    B        4.80      0.50     1.000    72
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.80      SUBAREA RUNOFF(CFS) =    3.94
  EFFECTIVE AREA(ACRES) =      9.90   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        9.9       PEAK FLOW RATE(CFS) =       8.12

****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     33.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   625.00  DOWNSTREAM(FEET) =   615.00
  FLOW LENGTH(FEET) =   335.00   MANNING'S N =  0.130
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.04
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.12
  PIPE TRAVEL TIME(MIN.) =   2.73    Tc(MIN.) =   15.23
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     33.00 =    1635.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   15.23
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.257
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL POOR COVER
  "BARREN"                    B        4.30      0.50     1.000    72
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.30      SUBAREA RUNOFF(CFS) =    2.91
  EFFECTIVE AREA(ACRES) =     14.20   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       14.2       PEAK FLOW RATE(CFS) =       9.62

****************************************************************************
  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) =   785.00
  ELEVATION DATA: UPSTREAM(FEET) =    700.00  DOWNSTREAM(FEET) =    605.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.522
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.486
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   B        4.80      0.50     1.000    72   11.52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      4.24
  TOTAL AREA(ACRES) =      4.80   PEAK FLOW RATE(CFS) =      4.24

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     42.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    605.00  DOWNSTREAM(FEET) =    583.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   830.00   CHANNEL SLOPE =  0.0265
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.269
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL POOR COVER
  "BARREN"                   B        9.20      0.50     1.000    72
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.43
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.99
  AVERAGE FLOW DEPTH(FEET) =   0.52   TRAVEL TIME(MIN.) =   3.46
  Tc(MIN.) =   14.99
  SUBAREA AREA(ACRES) =     9.20       SUBAREA RUNOFF(CFS) =    6.33
  EFFECTIVE AREA(ACRES) =     14.00     AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       14.0         PEAK FLOW RATE(CFS) =       9.64

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.59   FLOW VELOCITY(FEET/SEC.) =   4.31
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     42.00 =    1615.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     42.00 TO NODE     43.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    583.00  DOWNSTREAM(FEET) =    561.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   380.00   CHANNEL SLOPE =  0.0579
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.239
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL POOR COVER
  "BARREN"                   B        3.10      0.50     1.000    72
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.66
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  10.28
  AVERAGE FLOW DEPTH(FEET) =   0.38   TRAVEL TIME(MIN.) =   0.62
  Tc(MIN.) =   15.60
  SUBAREA AREA(ACRES) =     3.10       SUBAREA RUNOFF(CFS) =    2.05
  EFFECTIVE AREA(ACRES) =     17.10     AREA-AVERAGED Fm(INCH/HR) =   0.50
  AREA-AVERAGED Fp(INCH/HR) =   0.50  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       17.1         PEAK FLOW RATE(CFS) =      11.31

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.39   FLOW VELOCITY(FEET/SEC.) =  10.36
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     43.00 =    1995.00 FEET.

****************************************************************************
  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) =   700.00
  ELEVATION DATA: UPSTREAM(FEET) =    630.00  DOWNSTREAM(FEET) =    555.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.277
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.505
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   B        2.80      0.50     1.000    72   11.28
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.52
  TOTAL AREA(ACRES) =      2.80   PEAK FLOW RATE(CFS) =      2.52

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 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) =   700.00
  ELEVATION DATA: UPSTREAM(FEET) =    630.00  DOWNSTREAM(FEET) =    565.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.605
```

```
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.479
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                    B        2.40      0.50     1.000    72   11.60
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.11
  TOTAL AREA(ACRES) =      2.40   PEAK FLOW RATE(CFS) =      2.11
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        2.4  TC(MIN.) =     11.60
  EFFECTIVE AREA(ACRES) =      2.40  AREA-AVERAGED Fm(INCH/HR)=  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =       2.11
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
____________________________________________________________________________
****************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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                           Analysis prepared by:

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 ************************* DESCRIPTION OF STUDY *************************
* Hydrology Study for VTTM 20317 - Shady View Project                    *
* In the City of Chino Hills, San Bernardino County                      *
* Existing Condition, 25-year Storm                                      *
 ************************************************************************

  FILE NAME: 20317E.DAT
  TIME/DATE OF STUDY: 09:15 03/24/2020
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.0900

  *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
  2   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 =  0.50 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) =   850.00
  ELEVATION DATA: UPSTREAM(FEET) =   1060.00  DOWNSTREAM(FEET) =    740.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.479
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.298
  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
  "BARREN"                   B        5.70      0.27     1.000    86    9.48
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     15.52
  TOTAL AREA(ACRES) =      5.70   PEAK FLOW RATE(CFS) =     15.52

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    740.00  DOWNSTREAM(FEET) =    613.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00   CHANNEL SLOPE =  0.1270
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      15.52
  FLOW VELOCITY(FEET/SEC) =   8.86 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.88   Tc(MIN.) =   11.36
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =    1850.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.36
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.958
  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
  "BARREN"                   B        9.90      0.27     1.000    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    9.90      SUBAREA RUNOFF(CFS) =   23.94
  EFFECTIVE AREA(ACRES) =     15.60   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       15.6       PEAK FLOW RATE(CFS) =      37.72

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
```

```
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    613.00  DOWNSTREAM(FEET) =    575.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   430.00   CHANNEL SLOPE =  0.0884
  CHANNEL FLOW THRU SUBAREA(CFS) =      37.72
  FLOW VELOCITY(FEET/SEC) =  10.62 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.68   Tc(MIN.) =   12.04
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =    2280.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   12.04
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.858
  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
  "BARREN"                   B       17.30      0.27     1.000    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   17.30      SUBAREA RUNOFF(CFS) =   40.26
  EFFECTIVE AREA(ACRES) =     32.90   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       32.9       PEAK FLOW RATE(CFS) =      76.56

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   905.00
  ELEVATION DATA: UPSTREAM(FEET) =   1100.00  DOWNSTREAM(FEET) =    965.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.697
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.907
  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
  "BARREN"                   B        9.40      0.27     1.000    86   11.70
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     22.29
  TOTAL AREA(ACRES) =      9.40   PEAK FLOW RATE(CFS) =     22.29

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    965.00  DOWNSTREAM(FEET) =    905.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   675.00   CHANNEL SLOPE =  0.0889
  CHANNEL FLOW THRU SUBAREA(CFS) =      22.29
  FLOW VELOCITY(FEET/SEC) =   9.20 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.22   Tc(MIN.) =   12.92
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     22.00 =    1580.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   12.92
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.739
  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
  "BARREN"                   B       17.90      0.27     1.000    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   17.90      SUBAREA RUNOFF(CFS) =   39.74
  EFFECTIVE AREA(ACRES) =     27.30   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       27.3       PEAK FLOW RATE(CFS) =      60.61

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    905.00  DOWNSTREAM(FEET) =    804.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1235.00   CHANNEL SLOPE =  0.0818
  CHANNEL FLOW THRU SUBAREA(CFS) =      60.61
  FLOW VELOCITY(FEET/SEC) =  11.70 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.76   Tc(MIN.) =   14.68
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     23.00 =    2815.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   14.68
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.537
  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
  "BARREN"                   B       32.10      0.27     1.000    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   32.10      SUBAREA RUNOFF(CFS) =   65.43
  EFFECTIVE AREA(ACRES) =     59.40   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
```

```
  TOTAL AREA(ACRES) =       59.4       PEAK FLOW RATE(CFS) =     121.08

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    804.00  DOWNSTREAM(FEET) =    725.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1325.00   CHANNEL SLOPE =  0.0596
  CHANNEL FLOW THRU SUBAREA(CFS) =     121.08
  FLOW VELOCITY(FEET/SEC) =  12.28 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.80   Tc(MIN.) =   16.48
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     24.00 =    4140.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.48
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.367
  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
  "BARREN"                   B       27.40      0.27     1.000    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   27.40      SUBAREA RUNOFF(CFS) =   51.66
  EFFECTIVE AREA(ACRES) =     86.80   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       86.8       PEAK FLOW RATE(CFS) =     163.66

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     25.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    725.00  DOWNSTREAM(FEET) =    704.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   365.00   CHANNEL SLOPE =  0.0575
  CHANNEL FLOW THRU SUBAREA(CFS) =     163.66
  FLOW VELOCITY(FEET/SEC) =  13.22 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.46   Tc(MIN.) =   16.94
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     25.00 =    4505.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.94
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.328
  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
  "BARREN"                   B       63.60      0.27     1.000    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   63.60      SUBAREA RUNOFF(CFS) =  117.69
  EFFECTIVE AREA(ACRES) =    150.40   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      150.4       PEAK FLOW RATE(CFS) =     278.32

****************************************************************************
  FLOW PROCESS FROM NODE     25.00 TO NODE     26.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    704.00  DOWNSTREAM(FEET) =    645.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1345.00   CHANNEL SLOPE =  0.0439
  CHANNEL FLOW THRU SUBAREA(CFS) =     278.32
  FLOW VELOCITY(FEET/SEC) =  13.62 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.65   Tc(MIN.) =   18.58
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     26.00 =    5850.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     26.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.58
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.202
  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
  "BARREN"                   B       32.00      0.27     1.000    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   32.00      SUBAREA RUNOFF(CFS) =   55.59
  EFFECTIVE AREA(ACRES) =    182.40   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      182.4       PEAK FLOW RATE(CFS) =     316.85

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     27.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    645.00  DOWNSTREAM(FEET) =    573.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1755.00   CHANNEL SLOPE =  0.0410
  CHANNEL FLOW THRU SUBAREA(CFS) =     316.85
  FLOW VELOCITY(FEET/SEC) =  13.72 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.13   Tc(MIN.) =   20.72
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     27.00 =    7605.00 FEET.

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

```
  FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   20.72
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.063
  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
  "BARREN"                    B       39.70      0.27     1.000    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   39.70      SUBAREA RUNOFF(CFS) =   64.00
  EFFECTIVE AREA(ACRES) =    222.10   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      222.1       PEAK FLOW RATE(CFS) =     358.04

****************************************************************************
  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) =   865.00
  ELEVATION DATA: UPSTREAM(FEET) =    830.00  DOWNSTREAM(FEET) =    640.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.632
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.079
  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
  "BARREN"                    B        5.10      0.27     1.000    86   10.63
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     12.88
  TOTAL AREA(ACRES) =      5.10   PEAK FLOW RATE(CFS) =     12.88

****************************************************************************
  FLOW PROCESS FROM NODE     31.00 TO NODE     32.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    640.00  DOWNSTREAM(FEET) =    625.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   435.00   CHANNEL SLOPE =  0.0345
  CHANNEL FLOW THRU SUBAREA(CFS) =      12.88
  FLOW VELOCITY(FEET/SEC) =   4.95 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.46   Tc(MIN.) =   12.10
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     32.00 =    1300.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     32.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.10
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.849
  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
  "BARREN"                    B        4.80      0.27     1.000    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.80      SUBAREA RUNOFF(CFS) =   11.13
  EFFECTIVE AREA(ACRES) =      9.90   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        9.9       PEAK FLOW RATE(CFS) =      22.96

****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     33.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   625.00  DOWNSTREAM(FEET) =   615.00
  FLOW LENGTH(FEET) =   335.00   MANNING'S N =  0.130
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.78
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      22.96
  PIPE TRAVEL TIME(MIN.) =   0.97    Tc(MIN.) =   13.06
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     33.00 =    1635.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.06
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.721
  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
  "BARREN"                    B        4.30      0.27     1.000    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.30      SUBAREA RUNOFF(CFS) =    9.48
  EFFECTIVE AREA(ACRES) =     14.20   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       14.2       PEAK FLOW RATE(CFS) =      31.30

****************************************************************************
  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) =   785.00
  ELEVATION DATA: UPSTREAM(FEET) =    700.00  DOWNSTREAM(FEET) =    605.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.522
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.934
  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
  "BARREN"                   B        4.80      0.27     1.000    86   11.52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     11.50
  TOTAL AREA(ACRES) =      4.80   PEAK FLOW RATE(CFS) =     11.50

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     42.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    605.00  DOWNSTREAM(FEET) =    583.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   830.00   CHANNEL SLOPE =  0.0265
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.595
  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
  "BARREN"                   B        9.20      0.27     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) =      21.13
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.30
  AVERAGE FLOW DEPTH(FEET) =   0.87   TRAVEL TIME(MIN.) =   2.61
  Tc(MIN.) =   14.13
  SUBAREA AREA(ACRES) =     9.20       SUBAREA RUNOFF(CFS) =   19.24
  EFFECTIVE AREA(ACRES) =     14.00     AREA-AVERAGED Fm(INCH/HR) =   0.27
  AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       14.0         PEAK FLOW RATE(CFS) =      29.27

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.01   FLOW VELOCITY(FEET/SEC.) =   5.76
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     42.00 =    1615.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     42.00 TO NODE     43.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    583.00  DOWNSTREAM(FEET) =    561.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   380.00   CHANNEL SLOPE =  0.0579
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.547
  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
  "BARREN"                   B        3.10      0.27     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) =      32.45
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  14.09
  AVERAGE FLOW DEPTH(FEET) =   0.68   TRAVEL TIME(MIN.) =   0.45
  Tc(MIN.) =   14.58
  SUBAREA AREA(ACRES) =     3.10       SUBAREA RUNOFF(CFS) =    6.35
  EFFECTIVE AREA(ACRES) =     17.10     AREA-AVERAGED Fm(INCH/HR) =   0.27
  AREA-AVERAGED Fp(INCH/HR) =   0.27  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       17.1         PEAK FLOW RATE(CFS) =      35.01

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.71   FLOW VELOCITY(FEET/SEC.) =  14.35
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     43.00 =    1995.00 FEET.

****************************************************************************
  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) =   700.00
  ELEVATION DATA: UPSTREAM(FEET) =    630.00  DOWNSTREAM(FEET) =    555.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.277
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.972
  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
  "BARREN"                   B        2.80      0.27     1.000    86   11.28
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      6.80
  TOTAL AREA(ACRES) =      2.80   PEAK FLOW RATE(CFS) =      6.80

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 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) =   700.00
  ELEVATION DATA: UPSTREAM(FEET) =    630.00  DOWNSTREAM(FEET) =    565.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.605
```

```
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.921
  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
  "BARREN"                   B        2.40      0.27     1.000    86   11.60
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      5.72
  TOTAL AREA(ACRES) =      2.40   PEAK FLOW RATE(CFS) =      5.72
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        2.4  TC(MIN.) =     11.60
  EFFECTIVE AREA(ACRES) =      2.40  AREA-AVERAGED Fm(INCH/HR)=  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =       5.72
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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____________________________________________________________________________
****************************************************************************
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 ************************* DESCRIPTION OF STUDY *************************
* Hydrology Study for VTTM 20317 - Shady View Project                    *
* In the City of Chino Hills, San Bernardino County                      *
* Existing Condition, 100-year Storm                                     *
 ************************************************************************

  FILE NAME: 20317E.DAT
  TIME/DATE OF STUDY: 09:09 03/24/2020
============================================================================
  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 = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.4300

  *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   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 =  0.50 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) =   850.00
  ELEVATION DATA: UPSTREAM(FEET) =   1060.00  DOWNSTREAM(FEET) =    740.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.479
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.327
  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
  "BARREN"                   B        5.70      0.11     1.000    97    9.48
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.11
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     21.65
  TOTAL AREA(ACRES) =      5.70   PEAK FLOW RATE(CFS) =     21.65

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    740.00  DOWNSTREAM(FEET) =    613.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1000.00   CHANNEL SLOPE =  0.1270
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      21.65
  FLOW VELOCITY(FEET/SEC) =   9.68 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.72   Tc(MIN.) =   11.20
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =    1850.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.20
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.914
  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
  "BARREN"                   B        9.90      0.11     1.000    97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.11
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    9.90      SUBAREA RUNOFF(CFS) =   33.93
  EFFECTIVE AREA(ACRES) =     15.60   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.11  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       15.6       PEAK FLOW RATE(CFS) =      53.47

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
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```
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    613.00  DOWNSTREAM(FEET) =    575.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   430.00   CHANNEL SLOPE =  0.0884
  CHANNEL FLOW THRU SUBAREA(CFS) =      53.47
  FLOW VELOCITY(FEET/SEC) =  11.73 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.61   Tc(MIN.) =   11.81
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =    2280.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   11.81
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.792
  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
  "BARREN"                   B       17.30      0.11     1.000    97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.11
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   17.30      SUBAREA RUNOFF(CFS) =   57.39
  EFFECTIVE AREA(ACRES) =     32.90   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.11  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       32.9       PEAK FLOW RATE(CFS) =     109.13

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   905.00
  ELEVATION DATA: UPSTREAM(FEET) =   1100.00  DOWNSTREAM(FEET) =    965.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.697
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.814
  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
  "BARREN"                   B        9.40      0.11     1.000    97   11.70
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.11
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     31.37
  TOTAL AREA(ACRES) =      9.40   PEAK FLOW RATE(CFS) =     31.37

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    965.00  DOWNSTREAM(FEET) =    905.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   675.00   CHANNEL SLOPE =  0.0889
  CHANNEL FLOW THRU SUBAREA(CFS) =      31.37
  FLOW VELOCITY(FEET/SEC) =  10.11 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.11   Tc(MIN.) =   12.81
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     22.00 =    1580.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   12.81
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.612
  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
  "BARREN"                   B       17.90      0.11     1.000    97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.11
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   17.90      SUBAREA RUNOFF(CFS) =   56.47
  EFFECTIVE AREA(ACRES) =     27.30   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.11  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       27.3       PEAK FLOW RATE(CFS) =      86.13

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    905.00  DOWNSTREAM(FEET) =    804.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1235.00   CHANNEL SLOPE =  0.0818
  CHANNEL FLOW THRU SUBAREA(CFS) =      86.13
  FLOW VELOCITY(FEET/SEC) =  12.98 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.59   Tc(MIN.) =   14.40
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     23.00 =    2815.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   14.40
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.367
  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
  "BARREN"                   B       32.10      0.11     1.000    97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.11
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   32.10      SUBAREA RUNOFF(CFS) =   94.22
  EFFECTIVE AREA(ACRES) =     59.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.11  AREA-AVERAGED Ap =  1.00
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  TOTAL AREA(ACRES) =       59.4       PEAK FLOW RATE(CFS) =     174.35

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    804.00  DOWNSTREAM(FEET) =    725.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1325.00   CHANNEL SLOPE =  0.0596
  CHANNEL FLOW THRU SUBAREA(CFS) =     174.35
  FLOW VELOCITY(FEET/SEC) =  13.73 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.61   Tc(MIN.) =   16.00
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     24.00 =    4140.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.160
  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
  "BARREN"                   B       27.40      0.11     1.000    97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.11
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   27.40      SUBAREA RUNOFF(CFS) =   75.31
  EFFECTIVE AREA(ACRES) =     86.80   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.11  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       86.8       PEAK FLOW RATE(CFS) =     238.58

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE     25.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    725.00  DOWNSTREAM(FEET) =    704.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   365.00   CHANNEL SLOPE =  0.0575
  CHANNEL FLOW THRU SUBAREA(CFS) =     238.58
  FLOW VELOCITY(FEET/SEC) =  14.86 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.41   Tc(MIN.) =   16.41
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     25.00 =    4505.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   16.41
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.112
  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
  "BARREN"                   B       63.60      0.11     1.000    97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.11
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   63.60      SUBAREA RUNOFF(CFS) =  172.09
  EFFECTIVE AREA(ACRES) =    150.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.11  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      150.4       PEAK FLOW RATE(CFS) =     406.95

****************************************************************************
  FLOW PROCESS FROM NODE     25.00 TO NODE     26.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    704.00  DOWNSTREAM(FEET) =    645.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1345.00   CHANNEL SLOPE =  0.0439
  CHANNEL FLOW THRU SUBAREA(CFS) =     406.95
  FLOW VELOCITY(FEET/SEC) =  15.36 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.46   Tc(MIN.) =   17.87
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     26.00 =    5850.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     26.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.87
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.957
  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
  "BARREN"                   B       32.00      0.11     1.000    97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.11
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   32.00      SUBAREA RUNOFF(CFS) =   82.12
  EFFECTIVE AREA(ACRES) =    182.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.11  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      182.4       PEAK FLOW RATE(CFS) =     468.07

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     27.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    645.00  DOWNSTREAM(FEET) =    573.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1755.00   CHANNEL SLOPE =  0.0410
  CHANNEL FLOW THRU SUBAREA(CFS) =     468.07
  FLOW VELOCITY(FEET/SEC) =  15.53 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.88   Tc(MIN.) =   19.76
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     27.00 =    7605.00 FEET.

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  FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.76
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.785
  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
  "BARREN"                    B       39.70      0.11     1.000    97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.11
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   39.70      SUBAREA RUNOFF(CFS) =   95.71
  EFFECTIVE AREA(ACRES) =    222.10   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.11  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      222.1       PEAK FLOW RATE(CFS) =     535.46

****************************************************************************
  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) =   865.00
  ELEVATION DATA: UPSTREAM(FEET) =    830.00  DOWNSTREAM(FEET) =    640.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.632
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.039
  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
  "BARREN"                    B        5.10      0.11     1.000    97   10.63
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.11
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     18.05
  TOTAL AREA(ACRES) =      5.10   PEAK FLOW RATE(CFS) =     18.05

****************************************************************************
  FLOW PROCESS FROM NODE     31.00 TO NODE     32.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    640.00  DOWNSTREAM(FEET) =    625.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   435.00   CHANNEL SLOPE =  0.0345
  CHANNEL FLOW THRU SUBAREA(CFS) =      18.05
  FLOW VELOCITY(FEET/SEC) =   5.41 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.34   Tc(MIN.) =   11.97
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     32.00 =    1300.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     32.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.97
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.761
  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
  "BARREN"                    B        4.80      0.11     1.000    97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.11
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.80      SUBAREA RUNOFF(CFS) =   15.79
  EFFECTIVE AREA(ACRES) =      9.90   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.11  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        9.9       PEAK FLOW RATE(CFS) =      32.57

****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     33.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   625.00  DOWNSTREAM(FEET) =   615.00
  FLOW LENGTH(FEET) =   335.00   MANNING'S N =  0.130
  ASSUME FULL-FLOWING PIPELINE
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.19
  PIPE FLOW VELOCITY = (TOTAL FLOW)/(PIPE CROSS SECTION AREA)
  GIVEN PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      32.57
  PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =   12.65
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     33.00 =    1635.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.65
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.638
  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
  "BARREN"                    B        4.30      0.11     1.000    97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.11
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    4.30      SUBAREA RUNOFF(CFS) =   13.67
  EFFECTIVE AREA(ACRES) =     14.20   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.11  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       14.2       PEAK FLOW RATE(CFS) =      45.14

****************************************************************************
  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) =   785.00
  ELEVATION DATA: UPSTREAM(FEET) =    700.00  DOWNSTREAM(FEET) =    605.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.522
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.849
  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
  "BARREN"                   B        4.80      0.11     1.000    97   11.52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.11
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     16.17
  TOTAL AREA(ACRES) =      4.80   PEAK FLOW RATE(CFS) =     16.17

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     42.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    605.00  DOWNSTREAM(FEET) =    583.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   830.00   CHANNEL SLOPE =  0.0265
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   3.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   2.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.439
  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
  "BARREN"                   B        9.20      0.11     1.000    97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.11
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      29.98
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.81
  AVERAGE FLOW DEPTH(FEET) =   1.02   TRAVEL TIME(MIN.) =   2.38
  Tc(MIN.) =   13.90
  SUBAREA AREA(ACRES) =     9.20       SUBAREA RUNOFF(CFS) =   27.59
  EFFECTIVE AREA(ACRES) =     14.00     AREA-AVERAGED Fm(INCH/HR) =   0.11
  AREA-AVERAGED Fp(INCH/HR) =   0.11  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       14.0         PEAK FLOW RATE(CFS) =      41.99

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.19   FLOW VELOCITY(FEET/SEC.) =   6.31
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     42.00 =    1615.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     42.00 TO NODE     43.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    583.00  DOWNSTREAM(FEET) =    561.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   380.00   CHANNEL SLOPE =  0.0579
  CHANNEL BASE(FEET) =    2.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.380
  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
  "BARREN"                   B        3.10      0.11     1.000    97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.11
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      46.56
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =  15.57
  AVERAGE FLOW DEPTH(FEET) =   0.82   TRAVEL TIME(MIN.) =   0.41
  Tc(MIN.) =   14.31
  SUBAREA AREA(ACRES) =     3.10       SUBAREA RUNOFF(CFS) =    9.13
  EFFECTIVE AREA(ACRES) =     17.10     AREA-AVERAGED Fm(INCH/HR) =   0.11
  AREA-AVERAGED Fp(INCH/HR) =   0.11  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       17.1         PEAK FLOW RATE(CFS) =      50.38

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.86   FLOW VELOCITY(FEET/SEC.) =  15.82
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     43.00 =    1995.00 FEET.

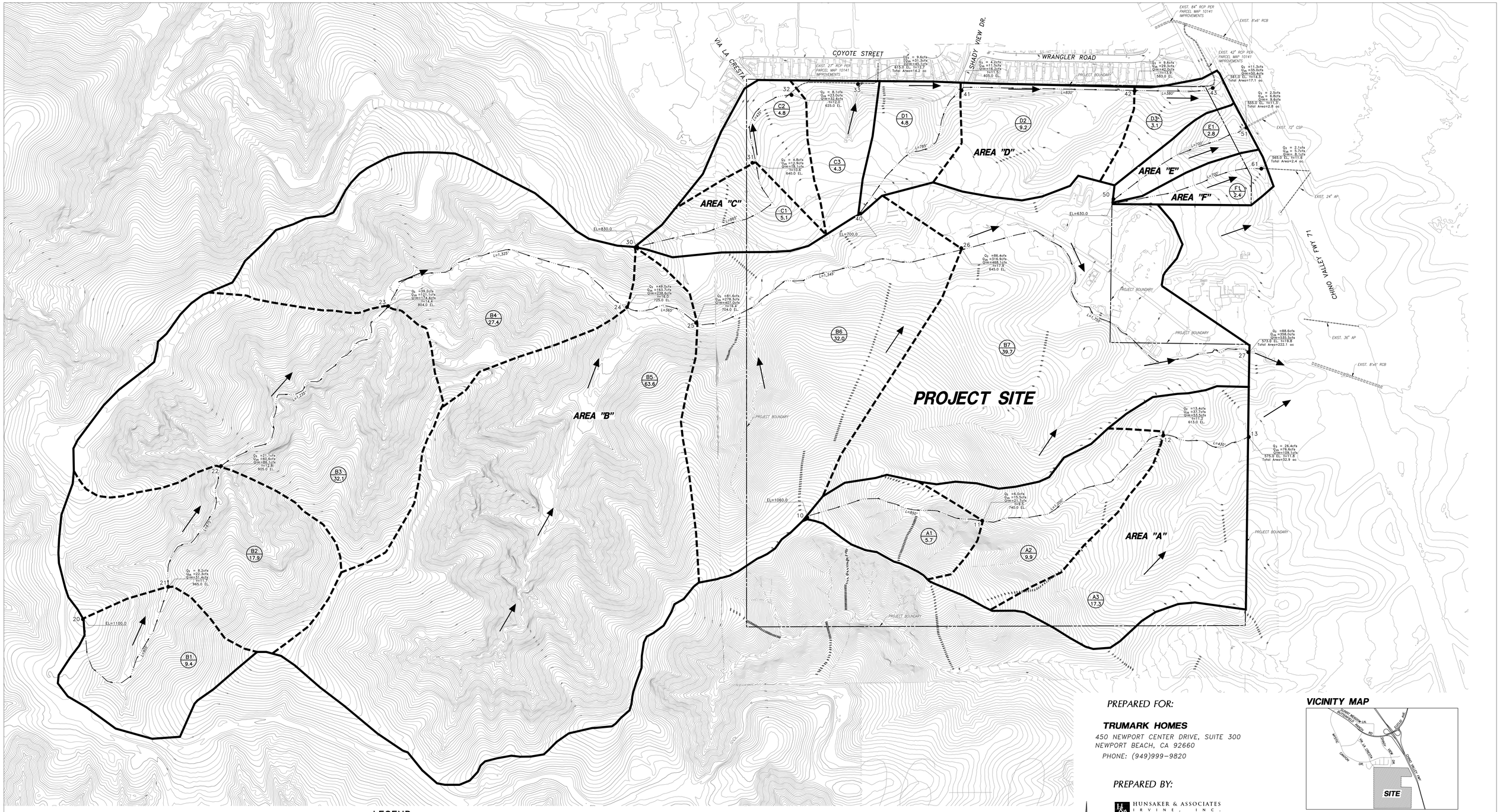
****************************************************************************
  FLOW PROCESS FROM NODE     50.00 TO NODE     51.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   700.00
  ELEVATION DATA: UPSTREAM(FEET) =    630.00  DOWNSTREAM(FEET) =    555.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.277
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.899
  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
  "BARREN"                   B        2.80      0.11     1.000    97   11.28
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.11
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      9.56
  TOTAL AREA(ACRES) =      2.80   PEAK FLOW RATE(CFS) =      9.56

****************************************************************************
  FLOW PROCESS FROM NODE     50.00 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) =   700.00
  ELEVATION DATA: UPSTREAM(FEET) =    630.00  DOWNSTREAM(FEET) =    565.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.605
```

```
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.832
  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
  "BARREN"                   B        2.40      0.11     1.000    97   11.60
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.11
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      8.05
  TOTAL AREA(ACRES) =      2.40   PEAK FLOW RATE(CFS) =      8.05
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        2.4  TC(MIN.) =     11.60
  EFFECTIVE AREA(ACRES) =      2.40  AREA-AVERAGED Fm(INCH/HR)=  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.11  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =       8.05
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```



LEGEND

- MAJOR DRAINAGE BOUNDARY
- MINOR DRAINAGE BOUNDARY
- 100 — NODE NUMBER
- A1 / 1.0 — AREA DESIGNATION / AREA ACREAGE (IN ACRES)
- Qpeak=9.0cfs / tc=15.0 — PEAK FLOW RATE / TIME OF CONCENTRATION
- Qpeak=19.0cfs / tc=15.0 — PEAK CONFLUENCE FLOW RATE / TIME OF CONCENTRATION
- EXISTING STORM DRAIN
- B — SOIL GROUP

PREPARED FOR:

TRUMARK HOMES
450 NEWPORT CENTER DRIVE, SUITE 300
NEWPORT BEACH, CA 92660
PHONE: (949)999-9820

PREPARED BY:

HUNSAKER & ASSOCIATES IRVINE, INC.
PLANNING • ENGINEERING • SURVEYING
Three Hughes • Irvine, CA 92618 • PH: (949) 583-1010 • FX: (949) 583-0759

GRAPHIC SCALE: 1"=120'

VICINITY MAP

EXISTING CONDITION
HYDROLOGY MAP
VTTM 20317
CITY OF CHINO HILLS
SAN BERNARDINO COUNTY

PLOTTED BY: Gary Guan DATE: Mar. 24, 2020 TIME: 06:15 PM F:\1062\Engineering\SY_Hydrology\Existing Hydrology Study.dwg

HUNSAKER & ASSOCIATES IRVINE, INC. HYDROLOGY MAP FOR SHADY VIEW PROJECT

SECTION 3
PROPOSED CONDITION HYDROLOGY
CALCULATIONS

```
____________________________________________________________________________
****************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
         (c) Copyright 1983-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1239

                          Analysis prepared by:

                          HUNSAKER & ASSOCIATES
                                Irvine,Inc
                   Planning * Engineering * Surveying
          Three Hughes * Irvine, California 92618 * (949)583-1010

 ************************* DESCRIPTION OF STUDY *************************
* Hydrology Study for VTTM 20317 - Shady View Project                    *
* In the City of Chino Hills, San Bernardino County                      *
* Proposed Condition, 2-year Storm                                       *
 ************************************************************************

  FILE NAME: 20317P.DAT
  TIME/DATE OF STUDY: 15:55 03/24/2020
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.5520

  *ANTECEDENT MOISTURE CONDITION (AMC) I 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   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 =  0.50 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) =   905.00
  ELEVATION DATA: UPSTREAM(FEET) =   1100.00  DOWNSTREAM(FEET) =    965.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.697
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.472
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   B        9.40      0.50     1.000    72   11.70
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      8.19
  TOTAL AREA(ACRES) =      9.40   PEAK FLOW RATE(CFS) =      8.19

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    965.00  DOWNSTREAM(FEET) =    905.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   675.00   CHANNEL SLOPE =  0.0889
  CHANNEL FLOW THRU SUBAREA(CFS) =       8.19
  FLOW VELOCITY(FEET/SEC) =   7.09 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.59   Tc(MIN.) =   13.28
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =    1580.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.28
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.364
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL POOR COVER
  "BARREN"                   B       17.90      0.50     1.000    72
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   17.90      SUBAREA RUNOFF(CFS) =   13.86
  EFFECTIVE AREA(ACRES) =     27.30   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       27.3       PEAK FLOW RATE(CFS) =      21.13

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
```

```
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    905.00  DOWNSTREAM(FEET) =    804.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1235.00   CHANNEL SLOPE =  0.0818
  CHANNEL FLOW THRU SUBAREA(CFS) =      21.13
  FLOW VELOCITY(FEET/SEC) =   8.70 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.37   Tc(MIN.) =   15.65
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =    2815.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   15.65
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.236
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL POOR COVER
  "BARREN"                   B       32.10      0.50     1.000    72
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   32.10      SUBAREA RUNOFF(CFS) =   21.15
  EFFECTIVE AREA(ACRES) =     59.40   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       59.4       PEAK FLOW RATE(CFS) =      39.15

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     14.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    804.00  DOWNSTREAM(FEET) =    725.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1325.00   CHANNEL SLOPE =  0.0596
  CHANNEL FLOW THRU SUBAREA(CFS) =      39.15
  FLOW VELOCITY(FEET/SEC) =   8.81 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.51   Tc(MIN.) =   18.16
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     14.00 =    4140.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   18.16
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.131
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL POOR COVER
  "BARREN"                   B       27.40      0.50     1.000    72
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   27.40      SUBAREA RUNOFF(CFS) =   15.46
  EFFECTIVE AREA(ACRES) =     86.80   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       86.8       PEAK FLOW RATE(CFS) =      48.97

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    725.00  DOWNSTREAM(FEET) =    704.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   365.00   CHANNEL SLOPE =  0.0575
  CHANNEL FLOW THRU SUBAREA(CFS) =      48.97
  FLOW VELOCITY(FEET/SEC) =   9.23 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.66   Tc(MIN.) =   18.82
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     15.00 =    4505.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   18.82
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.107
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL POOR COVER
  "BARREN"                   B       63.60      0.50     1.000    72
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   63.60      SUBAREA RUNOFF(CFS) =   34.51
  EFFECTIVE AREA(ACRES) =    150.40   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      150.4       PEAK FLOW RATE(CFS) =      81.61

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    704.00  DOWNSTREAM(FEET) =    650.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   900.00   CHANNEL SLOPE =  0.0600
  CHANNEL FLOW THRU SUBAREA(CFS) =      81.61
  FLOW VELOCITY(FEET/SEC) =  10.94 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.37   Tc(MIN.) =   20.19
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     16.00 =    5405.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   20.19
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.061
  SUBAREA LOSS RATE DATA(AMC  I ):
```

```
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL POOR COVER
  "BARREN"                   B       32.80      0.50     1.000    72
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   32.80      SUBAREA RUNOFF(CFS) =   16.45
  EFFECTIVE AREA(ACRES) =    183.20   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      183.2       PEAK FLOW RATE(CFS) =      91.87

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     35.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   650.00  DOWNSTREAM(FEET) =   649.00
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  36.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.51
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      91.87
  PIPE TRAVEL TIME(MIN.) =   0.27    Tc(MIN.) =   20.46
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     35.00 =    5560.00 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.) =   20.46
  RAINFALL INTENSITY(INCH/HR) =   1.05
  AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =     183.20
  TOTAL STREAM AREA(ACRES) =     183.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      91.87

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   540.00
  ELEVATION DATA: UPSTREAM(FEET) =    650.60  DOWNSTREAM(FEET) =    645.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.637
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.477
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        1.10      0.94     0.400    36   11.64
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      1.09
  TOTAL AREA(ACRES) =      1.10   PEAK FLOW RATE(CFS) =      1.09

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   645.20  DOWNSTREAM(FEET) =   644.30
  FLOW LENGTH(FEET) =   145.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.13
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.09
  PIPE TRAVEL TIME(MIN.) =   0.77    Tc(MIN.) =   12.41
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     22.00 =     685.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.41
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.421
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.20      0.94     0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.24
  EFFECTIVE AREA(ACRES) =      1.30   AREA-AVERAGED Fm(INCH/HR) =  0.33
  AREA-AVERAGED Fp(INCH/HR) =  0.94  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =        1.3       PEAK FLOW RATE(CFS) =       1.27

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.41
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.421
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.70      0.94     0.100    36
  PUBLIC PARK                B        3.30      0.94     0.850    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.719
```

```
  SUBAREA AREA(ACRES) =    4.00      SUBAREA RUNOFF(CFS) =    2.68
  EFFECTIVE AREA(ACRES) =      5.30   AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.94  AREA-AVERAGED Ap =  0.63
  TOTAL AREA(ACRES) =        5.3       PEAK FLOW RATE(CFS) =       3.95

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 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) =   644.30  DOWNSTREAM(FEET) =   643.50
  FLOW LENGTH(FEET) =   125.00   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.) =   4.50
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.95
  PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =   12.87
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     25.00 =     810.00 FEET.

****************************************************************************
  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.) =   12.87
  RAINFALL INTENSITY(INCH/HR) =   1.39
  AREA-AVERAGED Fm(INCH/HR) =  0.59
  AREA-AVERAGED Fp(INCH/HR) =  0.94
  AREA-AVERAGED Ap =  0.63
  EFFECTIVE STREAM AREA(ACRES) =       5.30
  TOTAL STREAM AREA(ACRES) =       5.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.95

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       91.87   20.46    1.053  0.50( 0.50) 1.00     183.2      10.00
      2        3.95   12.87    1.390  0.94( 0.59) 0.63       5.3      20.00

  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       95.82   12.87    1.390  0.52( 0.51) 0.98     120.6      20.00
      2       94.14   20.46    1.053  0.51( 0.51) 0.99     188.5      10.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      95.82    Tc(MIN.) =    12.87
  EFFECTIVE AREA(ACRES) =     120.56   AREA-AVERAGED Fm(INCH/HR) =  0.51
  AREA-AVERAGED Fp(INCH/HR) =  0.52  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      188.5
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     25.00 =    5560.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     25.00 TO NODE     26.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   643.50  DOWNSTREAM(FEET) =   638.20
  FLOW LENGTH(FEET) =   680.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  34.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.43
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      95.82
  PIPE TRAVEL TIME(MIN.) =   1.09    Tc(MIN.) =   13.96
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     26.00 =    6240.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     26.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.96
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.324
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.50      0.94     0.100    36
  PUBLIC PARK                B        2.90      0.94     0.850    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.740
  SUBAREA AREA(ACRES) =    3.40      SUBAREA RUNOFF(CFS) =    1.92
  EFFECTIVE AREA(ACRES) =    123.96   AREA-AVERAGED Fm(INCH/HR) =  0.51
  AREA-AVERAGED Fp(INCH/HR) =  0.53  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      191.9       PEAK FLOW RATE(CFS) =      95.82
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     27.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   638.20  DOWNSTREAM(FEET) =   635.20
  FLOW LENGTH(FEET) =   220.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  30.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.03
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      95.82
  PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =   14.24
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     27.00 =    6460.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 IS CODE =  81
```

```
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.24
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.308
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.50      0.94     0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    0.55
  EFFECTIVE AREA(ACRES) =    124.46   AREA-AVERAGED Fm(INCH/HR) =  0.51
  AREA-AVERAGED Fp(INCH/HR) =  0.53  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =      192.4       PEAK FLOW RATE(CFS) =      95.82
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.24
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.308
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.10      0.94     0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.11
  EFFECTIVE AREA(ACRES) =    124.56   AREA-AVERAGED Fm(INCH/HR) =  0.51
  AREA-AVERAGED Fp(INCH/HR) =  0.53  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =      192.5       PEAK FLOW RATE(CFS) =      95.82
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 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) =   635.20  DOWNSTREAM(FEET) =   634.80
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  32.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.06
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      95.82
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   14.31
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     40.00 =    6505.00 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.) =   14.31
  RAINFALL INTENSITY(INCH/HR) =   1.30
  AREA-AVERAGED Fm(INCH/HR) =  0.51
  AREA-AVERAGED Fp(INCH/HR) =  0.53
  AREA-AVERAGED Ap =  0.97
  EFFECTIVE STREAM AREA(ACRES) =     124.56
  TOTAL STREAM AREA(ACRES) =     192.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      95.82

****************************************************************************
  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) =   360.00
  ELEVATION DATA: UPSTREAM(FEET) =    639.00  DOWNSTREAM(FEET) =    635.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.349
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.584
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.20      0.94     0.500    36   10.35
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      1.20
  TOTAL AREA(ACRES) =      1.20   PEAK FLOW RATE(CFS) =      1.20

****************************************************************************
  FLOW PROCESS FROM NODE     31.00 TO NODE     32.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   635.50  DOWNSTREAM(FEET) =   634.80
  FLOW LENGTH(FEET) =    95.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.42
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.20
  PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =   10.81
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     32.00 =     455.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     32.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.81
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.543
```

```
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.60      0.94     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.60      SUBAREA RUNOFF(CFS) =    0.58
  EFFECTIVE AREA(ACRES) =      1.80   AREA-AVERAGED Fm(INCH/HR) =  0.47
  AREA-AVERAGED Fp(INCH/HR) =  0.94  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        1.8       PEAK FLOW RATE(CFS) =       1.74

****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     32.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.81
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.543
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.40      0.94     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.40      SUBAREA RUNOFF(CFS) =    1.35
  EFFECTIVE AREA(ACRES) =      3.20   AREA-AVERAGED Fm(INCH/HR) =  0.47
  AREA-AVERAGED Fp(INCH/HR) =  0.94  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        3.2       PEAK FLOW RATE(CFS) =       3.09

****************************************************************************
  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) =   634.80  DOWNSTREAM(FEET) =   632.60
  FLOW LENGTH(FEET) =   205.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.10
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.09
  PIPE TRAVEL TIME(MIN.) =   0.67    Tc(MIN.) =   11.48
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     33.00 =     660.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.48
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.489
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.20      0.94     0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.25
  EFFECTIVE AREA(ACRES) =      3.40   AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.94  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        3.4       PEAK FLOW RATE(CFS) =       3.18

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.48
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.489
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.40      0.94     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.40      SUBAREA RUNOFF(CFS) =    1.28
  EFFECTIVE AREA(ACRES) =      4.80   AREA-AVERAGED Fm(INCH/HR) =  0.46
  AREA-AVERAGED Fp(INCH/HR) =  0.94  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        4.8       PEAK FLOW RATE(CFS) =       4.46

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     34.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   632.60  DOWNSTREAM(FEET) =   632.30
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.22
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.46
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =   11.72
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     34.00 =     720.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.72
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.471
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.00      0.94     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.00      SUBAREA RUNOFF(CFS) =    0.90
  EFFECTIVE AREA(ACRES) =      5.80   AREA-AVERAGED Fm(INCH/HR) =  0.46
  AREA-AVERAGED Fp(INCH/HR) =  0.94  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =       5.29

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     35.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   632.30  DOWNSTREAM(FEET) =   627.50
  FLOW LENGTH(FEET) =   210.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.78
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.29
  PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =   12.17
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     35.00 =     930.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     35.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.17
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.438
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        2.40      0.94     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.40      SUBAREA RUNOFF(CFS) =    2.09
  EFFECTIVE AREA(ACRES) =      8.20   AREA-AVERAGED Fm(INCH/HR) =  0.46
  AREA-AVERAGED Fp(INCH/HR) =  0.94  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =        8.2       PEAK FLOW RATE(CFS) =       7.20

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     35.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.17
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.438
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.20      0.94     0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.24
  EFFECTIVE AREA(ACRES) =      8.40   AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.94  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        8.4       PEAK FLOW RATE(CFS) =       7.44

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     36.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   627.50  DOWNSTREAM(FEET) =   627.00
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.22
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.44
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =   12.41
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     36.00 =    1005.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.41
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.421
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.50      0.94     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.50      SUBAREA RUNOFF(CFS) =    1.28
  EFFECTIVE AREA(ACRES) =      9.90   AREA-AVERAGED Fm(INCH/HR) =  0.46
  AREA-AVERAGED Fp(INCH/HR) =  0.94  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        9.9       PEAK FLOW RATE(CFS) =       8.60

****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.41
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.421
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.60      0.94     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.60      SUBAREA RUNOFF(CFS) =    1.37
  EFFECTIVE AREA(ACRES) =     11.50   AREA-AVERAGED Fm(INCH/HR) =  0.46
  AREA-AVERAGED Fp(INCH/HR) =  0.94  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       11.5       PEAK FLOW RATE(CFS) =       9.97
```

```
****************************************************************************
  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) =   627.00  DOWNSTREAM(FEET) =   626.00
  FLOW LENGTH(FEET) =   460.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.63
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.97
  PIPE TRAVEL TIME(MIN.) =   2.11    Tc(MIN.) =   14.52
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     37.00 =    1465.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.00 TO NODE     37.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.52
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.293
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.80      0.94     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    0.59
  EFFECTIVE AREA(ACRES) =     12.30   AREA-AVERAGED Fm(INCH/HR) =  0.46
  AREA-AVERAGED Fp(INCH/HR) =  0.94  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       12.3       PEAK FLOW RATE(CFS) =       9.97
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     37.00 TO NODE     37.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.52
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.293
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.10      0.94     0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.11
  EFFECTIVE AREA(ACRES) =     12.40   AREA-AVERAGED Fm(INCH/HR) =  0.46
  AREA-AVERAGED Fp(INCH/HR) =  0.94  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       12.4       PEAK FLOW RATE(CFS) =       9.97
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     37.00 TO NODE     38.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   626.00  DOWNSTREAM(FEET) =   625.50
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.68
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.97
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   14.74
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     38.00 =    1540.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     38.00 TO NODE     38.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.74
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.282
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.10      0.94     0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.11
  EFFECTIVE AREA(ACRES) =     12.50   AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.94  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       12.5       PEAK FLOW RATE(CFS) =       9.97
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     38.00 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) =   625.50  DOWNSTREAM(FEET) =   625.00
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.68
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.97
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   14.96
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     40.00 =    1615.00 FEET.

****************************************************************************
  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.) =   14.96
```

```
  RAINFALL INTENSITY(INCH/HR) =   1.27
  AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.94
  AREA-AVERAGED Ap =  0.48
  EFFECTIVE STREAM AREA(ACRES) =      12.50
  TOTAL STREAM AREA(ACRES) =      12.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.97

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       95.82   14.31    1.305  0.53( 0.51) 0.97     124.6      20.00
      1       94.14   21.90    1.011  0.52( 0.51) 0.98     192.5      10.00
      2        9.97   14.96    1.270  0.94( 0.45) 0.48      12.5      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      105.75   14.31    1.305  0.54( 0.51) 0.93     136.5      20.00
      2      105.64   14.96    1.270  0.54( 0.51) 0.93     142.9      30.00
      3      100.95   21.90    1.011  0.53( 0.51) 0.95     205.0      10.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     105.75    Tc(MIN.) =    14.31
  EFFECTIVE AREA(ACRES) =     136.52   AREA-AVERAGED Fm(INCH/HR) =  0.51
  AREA-AVERAGED Fp(INCH/HR) =  0.54  AREA-AVERAGED Ap =  0.93
  TOTAL AREA(ACRES) =      205.0
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     40.00 =    6505.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     41.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   634.80  DOWNSTREAM(FEET) =   633.30
  FLOW LENGTH(FEET) =   190.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  34.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.86
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     105.75
  PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =   14.60
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     41.00 =    6695.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     41.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.60
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.289
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.90      0.94     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.90      SUBAREA RUNOFF(CFS) =    1.40
  EFFECTIVE AREA(ACRES) =    138.42   AREA-AVERAGED Fm(INCH/HR) =  0.51
  AREA-AVERAGED Fp(INCH/HR) =  0.55  AREA-AVERAGED Ap =  0.92
  TOTAL AREA(ACRES) =      206.9       PEAK FLOW RATE(CFS) =     105.75
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     41.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   14.60
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.289
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        3.60      0.94     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.60      SUBAREA RUNOFF(CFS) =    2.65
  EFFECTIVE AREA(ACRES) =    142.02   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.55  AREA-AVERAGED Ap =  0.91
  TOTAL AREA(ACRES) =      210.5       PEAK FLOW RATE(CFS) =     105.75
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     55.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   633.30  DOWNSTREAM(FEET) =   633.00
  FLOW LENGTH(FEET) =    15.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  30.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.20
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     105.75
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =   14.62
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     55.00 =    6710.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     55.00 TO NODE     55.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     46.00 TO NODE     47.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   850.00
  ELEVATION DATA: UPSTREAM(FEET) =   1060.00  DOWNSTREAM(FEET) =    740.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.479
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.670
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   B        5.70      0.50     1.000    72    9.48
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      5.98
  TOTAL AREA(ACRES) =      5.70   PEAK FLOW RATE(CFS) =      5.98

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     48.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    740.00  DOWNSTREAM(FEET) =    640.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   530.00   CHANNEL SLOPE =  0.1887
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       5.98
  FLOW VELOCITY(FEET/SEC) =   6.96 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.27   Tc(MIN.) =   10.75
  LONGEST FLOWPATH FROM NODE     46.00 TO NODE     48.00 =    1380.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   10.75
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.549
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL POOR COVER
  "BARREN"                   B        7.90      0.50     1.000    72
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    7.90      SUBAREA RUNOFF(CFS) =    7.43
  EFFECTIVE AREA(ACRES) =     13.60   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       13.6       PEAK FLOW RATE(CFS) =      12.79

****************************************************************************
  FLOW PROCESS FROM NODE     48.00 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) =   640.00  DOWNSTREAM(FEET) =   633.60
  FLOW LENGTH(FEET) =   360.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.56
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.79
  PIPE TRAVEL TIME(MIN.) =   0.70    Tc(MIN.) =   11.45
  LONGEST FLOWPATH FROM NODE     46.00 TO NODE     53.00 =    1740.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     53.00 TO NODE     53.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.45
  RAINFALL INTENSITY(INCH/HR) =   1.49
  AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      13.60
  TOTAL STREAM AREA(ACRES) =      13.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      12.79

****************************************************************************
  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) =   560.00
  ELEVATION DATA: UPSTREAM(FEET) =   1020.00  DOWNSTREAM(FEET) =    810.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.028
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.845
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   B        1.30      0.50     1.000    72    8.03
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.57
  TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      1.57

****************************************************************************
  FLOW PROCESS FROM NODE     51.00 TO NODE     52.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    810.00  DOWNSTREAM(FEET) =    630.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   620.00   CHANNEL SLOPE =  0.2903
```

```
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.57
  FLOW VELOCITY(FEET/SEC) =   5.18 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.00   Tc(MIN.) =   10.02
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     52.00 =    1180.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     52.00 TO NODE     52.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.02
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.615
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL POOR COVER
  "BARREN"                   B        6.10      0.50     1.000    72
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    6.10      SUBAREA RUNOFF(CFS) =    6.10
  EFFECTIVE AREA(ACRES) =      7.40   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        7.4       PEAK FLOW RATE(CFS) =       7.40

****************************************************************************
  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) =   630.00  DOWNSTREAM(FEET) =   629.50
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.44
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.40
  PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =   10.47
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     53.00 =    1300.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     53.00 TO NODE     53.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.47
  RAINFALL INTENSITY(INCH/HR) =   1.57
  AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       7.40
  TOTAL STREAM AREA(ACRES) =       7.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.40

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       12.79   11.45    1.491  0.50( 0.50) 1.00      13.6      46.00
      2        7.40   10.47    1.573  0.50( 0.50) 1.00       7.4      50.00

  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       20.07   10.47    1.573  0.50( 0.50) 1.00      19.8      50.00
      2       19.62   11.45    1.491  0.50( 0.50) 1.00      21.0      46.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      20.07    Tc(MIN.) =    10.47
  EFFECTIVE AREA(ACRES) =      19.84   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       21.0
  LONGEST FLOWPATH FROM NODE     46.00 TO NODE     53.00 =    1740.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     53.00 TO NODE     54.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   633.60  DOWNSTREAM(FEET) =   633.30
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.46
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      20.07
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   10.60
  LONGEST FLOWPATH FROM NODE     46.00 TO NODE     54.00 =    1790.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.60
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.562
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        1.30      0.94     0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.30      SUBAREA RUNOFF(CFS) =    1.72
  EFFECTIVE AREA(ACRES) =     21.14   AREA-AVERAGED Fm(INCH/HR) =  0.48
  AREA-AVERAGED Fp(INCH/HR) =  0.51  AREA-AVERAGED Ap =  0.94
  TOTAL AREA(ACRES) =       22.3       PEAK FLOW RATE(CFS) =      20.60
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.60
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.562
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        3.90      0.94     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.90      SUBAREA RUNOFF(CFS) =    3.83
  EFFECTIVE AREA(ACRES) =     25.04   AREA-AVERAGED Fm(INCH/HR) =  0.48
  AREA-AVERAGED Fp(INCH/HR) =  0.55  AREA-AVERAGED Ap =  0.88
  TOTAL AREA(ACRES) =       26.2       PEAK FLOW RATE(CFS) =      24.43

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     55.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   633.30  DOWNSTREAM(FEET) =   633.00
  FLOW LENGTH(FEET) =   230.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.84
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      24.43
  PIPE TRAVEL TIME(MIN.) =   1.00    Tc(MIN.) =   11.60
  LONGEST FLOWPATH FROM NODE     46.00 TO NODE     55.00 =    2020.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     55.00 TO NODE     55.00 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       24.43   11.60    1.479  0.55( 0.48) 0.88      25.0      50.00
      2       23.64   12.58    1.409  0.54( 0.48) 0.88      26.2      46.00
  LONGEST FLOWPATH FROM NODE     46.00 TO NODE     55.00 =    2020.00 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      105.75   14.62    1.288  0.55( 0.50) 0.91     142.0      20.00
      2      105.64   15.27    1.255  0.55( 0.50) 0.91     148.4      30.00
      3      100.95   22.21    1.002  0.54( 0.50) 0.94     210.5      10.00
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     55.00 =    6710.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      128.89   11.60    1.479  0.55( 0.50) 0.91     137.8      50.00
      2      128.76   12.58    1.409  0.55( 0.50) 0.91     148.5      46.00
      3      126.31   14.62    1.288  0.55( 0.50) 0.91     168.2      20.00
      4      125.36   15.27    1.255  0.55( 0.50) 0.91     174.6      30.00
      5      114.24   22.21    1.002  0.54( 0.50) 0.93     236.7      10.00
    TOTAL AREA(ACRES) =       236.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      128.89  Tc(MIN.) =   11.602
  EFFECTIVE AREA(ACRES) =    137.78  AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.55  AREA-AVERAGED Ap =  0.91
  TOTAL AREA(ACRES) =      236.7
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     55.00 =    6710.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     55.00 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) =   633.00  DOWNSTREAM(FEET) =   632.00
  FLOW LENGTH(FEET) =   520.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  50.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.67
  ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     128.89
  PIPE TRAVEL TIME(MIN.) =   1.30    Tc(MIN.) =   12.90
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     64.00 =    7230.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     64.00 TO NODE     64.00 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.) =   12.90
  RAINFALL INTENSITY(INCH/HR) =   1.39
  AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.55
  AREA-AVERAGED Ap =  0.91
  EFFECTIVE STREAM AREA(ACRES) =     137.78
  TOTAL STREAM AREA(ACRES) =     236.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     128.89

****************************************************************************
  FLOW PROCESS FROM NODE     55.00 TO NODE     56.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   880.00
  ELEVATION DATA: UPSTREAM(FEET) =    890.00  DOWNSTREAM(FEET) =    630.00
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.089
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.609
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                    B        7.10      0.50     1.000    72   10.09
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      7.06
  TOTAL AREA(ACRES) =      7.10   PEAK FLOW RATE(CFS) =      7.06

****************************************************************************
  FLOW PROCESS FROM NODE     56.00 TO NODE     57.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   630.00  DOWNSTREAM(FEET) =   629.00
  FLOW LENGTH(FEET) =   430.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.43
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.06
  PIPE TRAVEL TIME(MIN.) =   2.09    Tc(MIN.) =   12.18
  LONGEST FLOWPATH FROM NODE     55.00 TO NODE     57.00 =    1310.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.18
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.437
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        0.90      0.94     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.90      SUBAREA RUNOFF(CFS) =    0.78
  EFFECTIVE AREA(ACRES) =      8.00   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.53  AREA-AVERAGED Ap =  0.94
  TOTAL AREA(ACRES) =        8.0       PEAK FLOW RATE(CFS) =       7.06
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     58.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   632.00  DOWNSTREAM(FEET) =   631.50
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.11
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.06
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   12.31
  LONGEST FLOWPATH FROM NODE     55.00 TO NODE     58.00 =    1360.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.31
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.428
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        2.00      0.94     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.00      SUBAREA RUNOFF(CFS) =    1.72
  EFFECTIVE AREA(ACRES) =     10.00   AREA-AVERAGED Fm(INCH/HR) =  0.49
  AREA-AVERAGED Fp(INCH/HR) =  0.58  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =       10.0       PEAK FLOW RATE(CFS) =       8.40

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.31
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.428
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.10      0.94     0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.12
  EFFECTIVE AREA(ACRES) =     10.10   AREA-AVERAGED Fm(INCH/HR) =  0.49
  AREA-AVERAGED Fp(INCH/HR) =  0.58  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =       10.1       PEAK FLOW RATE(CFS) =       8.52

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.31
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.428
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.10      0.94     0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.12
  EFFECTIVE AREA(ACRES) =     10.20   AREA-AVERAGED Fm(INCH/HR) =  0.49
  AREA-AVERAGED Fp(INCH/HR) =  0.58  AREA-AVERAGED Ap =  0.84
  TOTAL AREA(ACRES) =       10.2       PEAK FLOW RATE(CFS) =       8.64

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     59.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   631.50  DOWNSTREAM(FEET) =   631.00
  FLOW LENGTH(FEET) =   235.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.55
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.64
  PIPE TRAVEL TIME(MIN.) =   1.10    Tc(MIN.) =   13.41
  LONGEST FLOWPATH FROM NODE     55.00 TO NODE     59.00 =    1595.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.00 TO NODE     59.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.41
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.356
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.70      0.94     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.70      SUBAREA RUNOFF(CFS) =    0.56
  EFFECTIVE AREA(ACRES) =     10.90   AREA-AVERAGED Fm(INCH/HR) =  0.49
  AREA-AVERAGED Fp(INCH/HR) =  0.59  AREA-AVERAGED Ap =  0.82
  TOTAL AREA(ACRES) =       10.9       PEAK FLOW RATE(CFS) =       8.64
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     59.00 TO NODE     60.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   631.00  DOWNSTREAM(FEET) =   630.50
  FLOW LENGTH(FEET) =    65.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.64
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.64
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   13.61
  LONGEST FLOWPATH FROM NODE     55.00 TO NODE     60.00 =    1660.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     60.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.61
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.345
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.10      0.94     0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.11
  EFFECTIVE AREA(ACRES) =     11.00   AREA-AVERAGED Fm(INCH/HR) =  0.48
  AREA-AVERAGED Fp(INCH/HR) =  0.59  AREA-AVERAGED Ap =  0.81
  TOTAL AREA(ACRES) =       11.0       PEAK FLOW RATE(CFS) =       8.64
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     60.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.61
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.345
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.00      0.94     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.00      SUBAREA RUNOFF(CFS) =    0.79
  EFFECTIVE AREA(ACRES) =     12.00   AREA-AVERAGED Fm(INCH/HR) =  0.48
  AREA-AVERAGED Fp(INCH/HR) =  0.61  AREA-AVERAGED Ap =  0.79
  TOTAL AREA(ACRES) =       12.0       PEAK FLOW RATE(CFS) =       9.33

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     61.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   630.50  DOWNSTREAM(FEET) =   630.00
  FLOW LENGTH(FEET) =   200.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.85
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.33
  PIPE TRAVEL TIME(MIN.) =   0.87    Tc(MIN.) =   14.47
  LONGEST FLOWPATH FROM NODE     55.00 TO NODE     61.00 =    1860.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   14.47
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.296
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.60      0.94     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.60      SUBAREA RUNOFF(CFS) =    1.19
  EFFECTIVE AREA(ACRES) =     13.60   AREA-AVERAGED Fm(INCH/HR) =  0.48
  AREA-AVERAGED Fp(INCH/HR) =  0.64  AREA-AVERAGED Ap =  0.75
  TOTAL AREA(ACRES) =       13.6       PEAK FLOW RATE(CFS) =       9.98

****************************************************************************
  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) =   630.00  DOWNSTREAM(FEET) =   629.80
  FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.12
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.98
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   14.54
  LONGEST FLOWPATH FROM NODE     55.00 TO NODE     62.00 =    1885.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     62.00 TO NODE     62.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   14.54
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.292
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.20      0.94     0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.22
  EFFECTIVE AREA(ACRES) =     13.80   AREA-AVERAGED Fm(INCH/HR) =  0.47
  AREA-AVERAGED Fp(INCH/HR) =  0.64  AREA-AVERAGED Ap =  0.74
  TOTAL AREA(ACRES) =       13.8       PEAK FLOW RATE(CFS) =      10.16

****************************************************************************
  FLOW PROCESS FROM NODE     62.00 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) =   629.80  DOWNSTREAM(FEET) =   629.50
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.74
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.16
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =   14.81
  LONGEST FLOWPATH FROM NODE     55.00 TO NODE     64.00 =    1960.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     64.00 TO NODE     64.00 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.) =   14.81
  RAINFALL INTENSITY(INCH/HR) =   1.28
  AREA-AVERAGED Fm(INCH/HR) =  0.47
  AREA-AVERAGED Fp(INCH/HR) =  0.64
  AREA-AVERAGED Ap =  0.74
  EFFECTIVE STREAM AREA(ACRES) =      13.80
  TOTAL STREAM AREA(ACRES) =      13.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      10.16

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      128.89   12.90    1.388  0.55( 0.50) 0.91     137.8      50.00
      1      128.76   13.88    1.329  0.55( 0.50) 0.91     148.5      46.00
      1      126.31   15.92    1.224  0.55( 0.50) 0.91     168.2      20.00
      1      125.36   16.57    1.195  0.55( 0.50) 0.91     174.6      30.00
      1      114.24   23.55    0.967  0.54( 0.50) 0.93     236.7      10.00
      2       10.16   14.81    1.278  0.64( 0.47) 0.74      13.8      55.00

  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      138.95   12.90    1.388  0.56( 0.50) 0.89     149.8      50.00
      2      138.87   13.88    1.329  0.56( 0.50) 0.89     161.4      46.00
      3      137.80   14.81    1.278  0.56( 0.50) 0.89     171.2      55.00
      4      135.78   15.92    1.224  0.56( 0.50) 0.90     182.0      20.00
      5      134.46   16.57    1.195  0.56( 0.50) 0.90     188.4      30.00
      6      120.47   23.55    0.967  0.54( 0.50) 0.92     250.5      10.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     138.95    Tc(MIN.) =    12.90
  EFFECTIVE AREA(ACRES) =     149.81   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.56  AREA-AVERAGED Ap =  0.89
  TOTAL AREA(ACRES) =      250.5
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     64.00 =    7230.00 FEET.

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

```
  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) =   629.50  DOWNSTREAM(FEET) =   574.00
  FLOW LENGTH(FEET) =   350.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  35.71
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     138.95
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   13.06
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     65.00 =    7580.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     65.00 TO NODE     66.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    574.00  DOWNSTREAM(FEET) =    573.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   130.00   CHANNEL SLOPE =  0.0077
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =  10.00
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.347
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"                B        4.20      0.85     1.000    46
  NATURAL POOR COVER
  "BARREN"                    B        5.60      0.50     1.000    72
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.65
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     142.02
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.31
  AVERAGE FLOW DEPTH(FEET) =   1.44   TRAVEL TIME(MIN.) =   0.50
  Tc(MIN.) =   13.57
  SUBAREA AREA(ACRES) =     9.80       SUBAREA RUNOFF(CFS) =    6.13
  EFFECTIVE AREA(ACRES) =    159.61     AREA-AVERAGED Fm(INCH/HR) =   0.51
  AREA-AVERAGED Fp(INCH/HR) =   0.56  AREA-AVERAGED Ap =   0.90
  TOTAL AREA(ACRES) =      260.3         PEAK FLOW RATE(CFS) =     138.95
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  1.42   FLOW VELOCITY(FEET/SEC.) =   4.28
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     66.00 =    7710.00 FEET.

****************************************************************************
  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) =   270.00
  ELEVATION DATA: UPSTREAM(FEET) =    645.20  DOWNSTREAM(FEET) =    642.80
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.661
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.475
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  PUBLIC PARK                 B        1.00      0.94     0.850    36   11.66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      0.61
  TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      0.61

****************************************************************************
  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) =   642.80  DOWNSTREAM(FEET) =   640.00
  FLOW LENGTH(FEET) =   240.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.28
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.61
  PIPE TRAVEL TIME(MIN.) =   1.22    Tc(MIN.) =   12.88
  LONGEST FLOWPATH FROM NODE     70.00 TO NODE     72.00 =     510.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     72.00 TO NODE     72.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.88
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.390
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        1.10      0.94     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.10      SUBAREA RUNOFF(CFS) =    0.91
  EFFECTIVE AREA(ACRES) =      2.10   AREA-AVERAGED Fm(INCH/HR) =  0.63
  AREA-AVERAGED Fp(INCH/HR) =  0.94  AREA-AVERAGED Ap =  0.67
  TOTAL AREA(ACRES) =        2.1       PEAK FLOW RATE(CFS) =       1.44

****************************************************************************
  FLOW PROCESS FROM NODE     72.00 TO NODE     73.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   640.00  DOWNSTREAM(FEET) =   634.40
  FLOW LENGTH(FEET) =    90.00   MANNING'S N =  0.013
```

```
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.67
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.44
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   13.08
  LONGEST FLOWPATH FROM NODE     70.00 TO NODE     73.00 =     600.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     73.00 TO NODE     73.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.08
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.377
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.20      0.94     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    0.98
  EFFECTIVE AREA(ACRES) =      3.30   AREA-AVERAGED Fm(INCH/HR) =  0.57
  AREA-AVERAGED Fp(INCH/HR) =  0.94  AREA-AVERAGED Ap =  0.61
  TOTAL AREA(ACRES) =        3.3       PEAK FLOW RATE(CFS) =       2.39

****************************************************************************
  FLOW PROCESS FROM NODE     73.00 TO NODE     73.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.08
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.377
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.90      0.94     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.90      SUBAREA RUNOFF(CFS) =    1.55
  EFFECTIVE AREA(ACRES) =      5.20   AREA-AVERAGED Fm(INCH/HR) =  0.53
  AREA-AVERAGED Fp(INCH/HR) =  0.94  AREA-AVERAGED Ap =  0.57
  TOTAL AREA(ACRES) =        5.2       PEAK FLOW RATE(CFS) =       3.94

****************************************************************************
  FLOW PROCESS FROM NODE     73.00 TO NODE     74.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   634.40  DOWNSTREAM(FEET) =   628.30
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.25
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.94
  PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   13.16
  LONGEST FLOWPATH FROM NODE     70.00 TO NODE     74.00 =     660.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     74.00 TO NODE     74.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.16
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.372
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.50      0.94     0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    0.57
  EFFECTIVE AREA(ACRES) =      5.70   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.94  AREA-AVERAGED Ap =  0.53
  TOTAL AREA(ACRES) =        5.7       PEAK FLOW RATE(CFS) =       4.49

****************************************************************************
  FLOW PROCESS FROM NODE     74.00 TO NODE     75.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   628.30  DOWNSTREAM(FEET) =   618.50
  FLOW LENGTH(FEET) =   105.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.34
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.49
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   13.30
  LONGEST FLOWPATH FROM NODE     70.00 TO NODE     75.00 =     765.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     75.00 TO NODE     75.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.30
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.363
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.90      0.94     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.90      SUBAREA RUNOFF(CFS) =    0.72
  EFFECTIVE AREA(ACRES) =      6.60   AREA-AVERAGED Fm(INCH/HR) =  0.49
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.94  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =        6.6       PEAK FLOW RATE(CFS) =       5.17

****************************************************************************
  FLOW PROCESS FROM NODE     75.00 TO NODE     75.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.30
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.363
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.40      0.94     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    0.32
  EFFECTIVE AREA(ACRES) =      7.00   AREA-AVERAGED Fm(INCH/HR) =  0.49
  AREA-AVERAGED Fp(INCH/HR) =  0.94  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =        7.0       PEAK FLOW RATE(CFS) =       5.49

****************************************************************************
  FLOW PROCESS FROM NODE     75.00 TO NODE     76.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   618.50  DOWNSTREAM(FEET) =   605.00
  FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.77
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.49
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   13.45
  LONGEST FLOWPATH FROM NODE     70.00 TO NODE     76.00 =     890.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     76.00 TO NODE     76.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.45
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.354
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        0.80      0.85     1.000    46
  COMMERCIAL                 B        0.40      0.94     0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.85
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.700
  SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    0.82
  EFFECTIVE AREA(ACRES) =      8.20   AREA-AVERAGED Fm(INCH/HR) =  0.51
  AREA-AVERAGED Fp(INCH/HR) =  0.93  AREA-AVERAGED Ap =  0.55
  TOTAL AREA(ACRES) =        8.2       PEAK FLOW RATE(CFS) =       6.25

****************************************************************************
  FLOW PROCESS FROM NODE     76.00 TO NODE     76.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.45
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.354
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.20      0.94     0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.23
  EFFECTIVE AREA(ACRES) =      8.40   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.93  AREA-AVERAGED Ap =  0.54
  TOTAL AREA(ACRES) =        8.4       PEAK FLOW RATE(CFS) =       6.48

****************************************************************************
  FLOW PROCESS FROM NODE     76.00 TO NODE     94.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   605.00  DOWNSTREAM(FEET) =   565.00
  FLOW LENGTH(FEET) =  1100.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.73
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.48
  PIPE TRAVEL TIME(MIN.) =   1.88    Tc(MIN.) =   15.33
  LONGEST FLOWPATH FROM NODE     70.00 TO NODE     94.00 =    1990.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     94.00 TO NODE     94.00 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.) =   15.33
  RAINFALL INTENSITY(INCH/HR) =   1.25
  AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.93
  AREA-AVERAGED Ap =  0.54
  EFFECTIVE STREAM AREA(ACRES) =       8.40
  TOTAL STREAM AREA(ACRES) =       8.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.48

****************************************************************************
  FLOW PROCESS FROM NODE     80.00 TO NODE     81.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   450.00
  ELEVATION DATA: UPSTREAM(FEET) =    629.10  DOWNSTREAM(FEET) =    624.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.155
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.515
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.20      0.94     0.500    36   11.15
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      1.13
  TOTAL AREA(ACRES) =      1.20   PEAK FLOW RATE(CFS) =      1.13

****************************************************************************
  FLOW PROCESS FROM NODE     81.00 TO NODE     82.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   624.40  DOWNSTREAM(FEET) =   624.00
  FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.41
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.13
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   11.25
  LONGEST FLOWPATH FROM NODE     80.00 TO NODE     82.00 =     475.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     82.00 TO NODE     82.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.25
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.507
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.20      0.94     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    1.12
  EFFECTIVE AREA(ACRES) =      2.40   AREA-AVERAGED Fm(INCH/HR) =  0.47
  AREA-AVERAGED Fp(INCH/HR) =  0.94  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        2.4       PEAK FLOW RATE(CFS) =       2.24

****************************************************************************
  FLOW PROCESS FROM NODE     82.00 TO NODE     88.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   624.00  DOWNSTREAM(FEET) =   623.40
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.20
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.24
  PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   11.55
  LONGEST FLOWPATH FROM NODE     80.00 TO NODE     88.00 =     550.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     88.00 TO NODE     88.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.55
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.484
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.70      0.94     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.70      SUBAREA RUNOFF(CFS) =    0.64
  EFFECTIVE AREA(ACRES) =      3.10   AREA-AVERAGED Fm(INCH/HR) =  0.47
  AREA-AVERAGED Fp(INCH/HR) =  0.94  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =       2.83

****************************************************************************
  FLOW PROCESS FROM NODE     88.00 TO NODE     88.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.55
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.484
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.20      0.94     0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.25
  EFFECTIVE AREA(ACRES) =      3.30   AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.94  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        3.3       PEAK FLOW RATE(CFS) =       3.08

****************************************************************************
  FLOW PROCESS FROM NODE     88.00 TO NODE     89.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   623.40  DOWNSTREAM(FEET) =   620.90
  FLOW LENGTH(FEET) =   260.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.89
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.08
  PIPE TRAVEL TIME(MIN.) =   0.89    Tc(MIN.) =   12.43
  LONGEST FLOWPATH FROM NODE     80.00 TO NODE     89.00 =     810.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     89.00 TO NODE     89.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.43
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.419
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.90      0.94     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.90      SUBAREA RUNOFF(CFS) =    0.77
  EFFECTIVE AREA(ACRES) =      4.20   AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.94  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        4.2       PEAK FLOW RATE(CFS) =       3.65

****************************************************************************
  FLOW PROCESS FROM NODE     89.00 TO NODE     90.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   620.90  DOWNSTREAM(FEET) =   620.20
  FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.21
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.65
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   12.66
  LONGEST FLOWPATH FROM NODE     80.00 TO NODE     90.00 =     880.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     90.00 TO NODE     90.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.66
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.404
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.60      0.94     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.60      SUBAREA RUNOFF(CFS) =    0.50
  EFFECTIVE AREA(ACRES) =      4.80   AREA-AVERAGED Fm(INCH/HR) =  0.46
  AREA-AVERAGED Fp(INCH/HR) =  0.94  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        4.8       PEAK FLOW RATE(CFS) =       4.10

****************************************************************************
  FLOW PROCESS FROM NODE     90.00 TO NODE     90.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.66
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.404
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.80      0.94     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    0.67
  EFFECTIVE AREA(ACRES) =      5.60   AREA-AVERAGED Fm(INCH/HR) =  0.46
  AREA-AVERAGED Fp(INCH/HR) =  0.94  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =        5.6       PEAK FLOW RATE(CFS) =       4.77

****************************************************************************
  FLOW PROCESS FROM NODE     90.00 TO NODE     91.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   620.20  DOWNSTREAM(FEET) =   618.00
  FLOW LENGTH(FEET) =   220.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.58
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.77
  PIPE TRAVEL TIME(MIN.) =   0.66    Tc(MIN.) =   13.31
  LONGEST FLOWPATH FROM NODE     80.00 TO NODE     91.00 =    1100.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     91.00 TO NODE     91.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.31
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.362
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.80      0.94     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    0.64
  EFFECTIVE AREA(ACRES) =      6.40   AREA-AVERAGED Fm(INCH/HR) =  0.46
  AREA-AVERAGED Fp(INCH/HR) =  0.94  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =        6.4       PEAK FLOW RATE(CFS) =       5.20

****************************************************************************
  FLOW PROCESS FROM NODE     91.00 TO NODE     92.00 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) =   617.50
  FLOW LENGTH(FEET) =    60.00   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.) =   5.32
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.20
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   13.50
  LONGEST FLOWPATH FROM NODE     80.00 TO NODE     92.00 =    1160.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     92.00 TO NODE     92.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.50
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.351
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        3.20      0.94     0.500    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.20      SUBAREA RUNOFF(CFS) =    2.53
  EFFECTIVE AREA(ACRES) =      9.60   AREA-AVERAGED Fm(INCH/HR) =  0.46
  AREA-AVERAGED Fp(INCH/HR) =  0.94  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =        9.6       PEAK FLOW RATE(CFS) =       7.67

****************************************************************************
  FLOW PROCESS FROM NODE     92.00 TO NODE     94.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   617.50  DOWNSTREAM(FEET) =   565.00
  FLOW LENGTH(FEET) =   400.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.22
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.67
  PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =   13.91
  LONGEST FLOWPATH FROM NODE     80.00 TO NODE     94.00 =    1560.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     94.00 TO NODE     94.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.91
  RAINFALL INTENSITY(INCH/HR) =   1.33
  AREA-AVERAGED Fm(INCH/HR) =  0.46
  AREA-AVERAGED Fp(INCH/HR) =  0.94
  AREA-AVERAGED Ap =  0.49
  EFFECTIVE STREAM AREA(ACRES) =       9.60
  TOTAL STREAM AREA(ACRES) =       9.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.67

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        6.48   15.33    1.252  0.93( 0.50) 0.54       8.4      70.00
      2        7.67   13.91    1.327  0.94( 0.46) 0.49       9.6      80.00

  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       14.13   13.91    1.327  0.93( 0.48) 0.51      17.2      80.00
      2       13.48   15.33    1.252  0.93( 0.48) 0.51      18.0      70.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      14.13    Tc(MIN.) =    13.91
  EFFECTIVE AREA(ACRES) =      17.22   AREA-AVERAGED Fm(INCH/HR) =  0.48
  AREA-AVERAGED Fp(INCH/HR) =  0.93  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =       18.0
  LONGEST FLOWPATH FROM NODE     70.00 TO NODE     94.00 =    1990.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     94.00 TO NODE     95.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   565.00  DOWNSTREAM(FEET) =   561.00
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.60
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.13
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   13.96
  LONGEST FLOWPATH FROM NODE     70.00 TO NODE     95.00 =    2035.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     95.00 TO NODE     95.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.96
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.324
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        3.50      0.85     1.000    46
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.85
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.50      SUBAREA RUNOFF(CFS) =    1.50
  EFFECTIVE AREA(ACRES) =     20.72   AREA-AVERAGED Fm(INCH/HR) =  0.54
  AREA-AVERAGED Fp(INCH/HR) =  0.91  AREA-AVERAGED Ap =  0.59
  TOTAL AREA(ACRES) =       21.5       PEAK FLOW RATE(CFS) =      14.61

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   865.00
  ELEVATION DATA: UPSTREAM(FEET) =    830.00  DOWNSTREAM(FEET) =    640.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.632
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.559
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   B        3.40      0.50     1.000    72   10.63
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      3.23
  TOTAL AREA(ACRES) =      3.40   PEAK FLOW RATE(CFS) =      3.23

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    640.00  DOWNSTREAM(FEET) =    630.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   230.00   CHANNEL SLOPE =  0.0435
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.23
  FLOW VELOCITY(FEET/SEC) =   3.98 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.96   Tc(MIN.) =   11.60
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =    1095.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.60
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.480
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL POOR COVER
  "BARREN"                   B        2.60      0.50     1.000    72
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.50
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.60      SUBAREA RUNOFF(CFS) =    2.28
  EFFECTIVE AREA(ACRES) =      6.00   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.50  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        6.0       PEAK FLOW RATE(CFS) =       5.27

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   630.00  DOWNSTREAM(FEET) =   628.00
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.29
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.27
  PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =   12.01
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =    1250.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.01
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.449
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.20      0.94     0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.24
  EFFECTIVE AREA(ACRES) =      6.20   AREA-AVERAGED Fm(INCH/HR) =  0.49
  AREA-AVERAGED Fp(INCH/HR) =  0.51  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =        6.2       PEAK FLOW RATE(CFS) =       5.35

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
  MAINLINE Tc(MIN.) =   12.01
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.449
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.20      0.94     0.100    36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.94
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.24
  EFFECTIVE AREA(ACRES) =      6.40   AREA-AVERAGED Fm(INCH/HR) =  0.48
  AREA-AVERAGED Fp(INCH/HR) =  0.51  AREA-AVERAGED Ap =  0.94
  TOTAL AREA(ACRES) =        6.4       PEAK FLOW RATE(CFS) =       5.59

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   628.00  DOWNSTREAM(FEET) =   627.50
  FLOW LENGTH(FEET) =   190.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.49
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.59
  PIPE TRAVEL TIME(MIN.) =   0.91    Tc(MIN.) =   12.91
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =    1440.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.91
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.387
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        0.60      0.85     1.000    46
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.85
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    0.60      SUBAREA RUNOFF(CFS) =    0.29
  EFFECTIVE AREA(ACRES) =      7.00   AREA-AVERAGED Fm(INCH/HR) =  0.51
  AREA-AVERAGED Fp(INCH/HR) =  0.54  AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =        7.0       PEAK FLOW RATE(CFS) =       5.59
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   627.50  DOWNSTREAM(FEET) =   615.00
  FLOW LENGTH(FEET) =   320.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS   5.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.23
  GIVEN PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.59
  PIPE TRAVEL TIME(MIN.) =   0.58    Tc(MIN.) =   13.49
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =    1760.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.49
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.351
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        0.80      0.85     1.000    46
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.85
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    0.36
  EFFECTIVE AREA(ACRES) =      7.80   AREA-AVERAGED Fm(INCH/HR) =  0.54
  AREA-AVERAGED Fp(INCH/HR) =  0.57  AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =        7.8       PEAK FLOW RATE(CFS) =       5.66

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    111.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   185.00
  ELEVATION DATA: UPSTREAM(FEET) =    620.00  DOWNSTREAM(FEET) =    555.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.023
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.999
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        0.80      0.85     1.000    46    7.02
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.85
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.83
  TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      0.83

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    121.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   650.00
  ELEVATION DATA: UPSTREAM(FEET) =    625.00  DOWNSTREAM(FEET) =    565.00
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.168
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.260
  SUBAREA Tc AND LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL FAIR COVER
  "OPEN BRUSH"               B        1.10      0.85     1.000    46   15.17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.85
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.41
  TOTAL AREA(ACRES) =      1.10   PEAK FLOW RATE(CFS) =      0.41
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.1  TC(MIN.) =     15.17
  EFFECTIVE AREA(ACRES) =      1.10  AREA-AVERAGED Fm(INCH/HR)=  0.85
  AREA-AVERAGED Fp(INCH/HR) =  0.85  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =       0.41
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
____________________________________________________________________________
****************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
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                           Analysis prepared by:

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 ************************* DESCRIPTION OF STUDY *************************
* Hydrology Study for VTTM 20317 - Shady View Project                    *
* In the City of Chino Hills, San Bernardino County                      *
* Proposed Condition, 25-year Storm                                      *
 ************************************************************************

  FILE NAME: 20317P.DAT
  TIME/DATE OF STUDY: 15:56 03/24/2020
============================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
============================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.0900

  *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
  2   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 =  0.50 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) =   905.00
  ELEVATION DATA: UPSTREAM(FEET) =   1100.00  DOWNSTREAM(FEET) =    965.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.697
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.907
  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
  "BARREN"                   B        9.40      0.27     1.000    86   11.70
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     22.29
  TOTAL AREA(ACRES) =      9.40   PEAK FLOW RATE(CFS) =     22.29

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    965.00  DOWNSTREAM(FEET) =    905.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   675.00   CHANNEL SLOPE =  0.0889
  CHANNEL FLOW THRU SUBAREA(CFS) =      22.29
  FLOW VELOCITY(FEET/SEC) =   9.20 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.22   Tc(MIN.) =   12.92
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =    1580.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.92
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.739
  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
  "BARREN"                   B       17.90      0.27     1.000    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   17.90      SUBAREA RUNOFF(CFS) =   39.74
  EFFECTIVE AREA(ACRES) =     27.30   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       27.3       PEAK FLOW RATE(CFS) =      60.61

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
```

```
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    905.00  DOWNSTREAM(FEET) =    804.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1235.00   CHANNEL SLOPE =  0.0818
  CHANNEL FLOW THRU SUBAREA(CFS) =      60.61
  FLOW VELOCITY(FEET/SEC) =  11.70 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.76   Tc(MIN.) =   14.68
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =    2815.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   14.68
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.537
  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
  "BARREN"                   B       32.10      0.27     1.000    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   32.10      SUBAREA RUNOFF(CFS) =   65.43
  EFFECTIVE AREA(ACRES) =     59.40   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       59.4       PEAK FLOW RATE(CFS) =     121.08

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     14.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    804.00  DOWNSTREAM(FEET) =    725.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1325.00   CHANNEL SLOPE =  0.0596
  CHANNEL FLOW THRU SUBAREA(CFS) =     121.08
  FLOW VELOCITY(FEET/SEC) =  12.28 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.80   Tc(MIN.) =   16.48
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     14.00 =    4140.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   16.48
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.367
  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
  "BARREN"                   B       27.40      0.27     1.000    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   27.40      SUBAREA RUNOFF(CFS) =   51.66
  EFFECTIVE AREA(ACRES) =     86.80   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       86.8       PEAK FLOW RATE(CFS) =     163.66

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    725.00  DOWNSTREAM(FEET) =    704.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   365.00   CHANNEL SLOPE =  0.0575
  CHANNEL FLOW THRU SUBAREA(CFS) =     163.66
  FLOW VELOCITY(FEET/SEC) =  13.22 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.46   Tc(MIN.) =   16.94
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     15.00 =    4505.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   16.94
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.328
  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
  "BARREN"                   B       63.60      0.27     1.000    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   63.60      SUBAREA RUNOFF(CFS) =  117.69
  EFFECTIVE AREA(ACRES) =    150.40   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      150.4       PEAK FLOW RATE(CFS) =     278.32

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    704.00  DOWNSTREAM(FEET) =    650.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   900.00   CHANNEL SLOPE =  0.0600
  CHANNEL FLOW THRU SUBAREA(CFS) =     278.32
  FLOW VELOCITY(FEET/SEC) =  15.93 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.94   Tc(MIN.) =   17.88
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     16.00 =    5405.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   17.88
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.254
  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
  "BARREN"                   B       32.80      0.27     1.000    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   32.80      SUBAREA RUNOFF(CFS) =   58.50
  EFFECTIVE AREA(ACRES) =    183.20   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      183.2       PEAK FLOW RATE(CFS) =     326.75

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     35.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   650.00  DOWNSTREAM(FEET) =   649.00
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  75.0 INCH PIPE IS  56.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.29
  ESTIMATED PIPE DIAMETER(INCH) =  75.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     326.75
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   18.07
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     35.00 =    5560.00 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.) =   18.07
  RAINFALL INTENSITY(INCH/HR) =   2.24
  AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =     183.20
  TOTAL STREAM AREA(ACRES) =     183.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     326.75

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   540.00
  ELEVATION DATA: UPSTREAM(FEET) =    650.60  DOWNSTREAM(FEET) =    645.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.637
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.916
  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.)
  RESIDENTIAL
  "8-10 DWELLINGS/ACRE"      B        1.10      0.75     0.400    56   11.64
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      2.59
  TOTAL AREA(ACRES) =      1.10   PEAK FLOW RATE(CFS) =      2.59

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   645.20  DOWNSTREAM(FEET) =   644.30
  FLOW LENGTH(FEET) =   145.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.99
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.59
  PIPE TRAVEL TIME(MIN.) =   0.61    Tc(MIN.) =   12.24
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     22.00 =     685.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.24
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.829
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.20      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.50
  EFFECTIVE AREA(ACRES) =      1.30   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =        1.3       PEAK FLOW RATE(CFS) =       3.00

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.24
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.829
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.70      0.75     0.100    56
  PUBLIC PARK                B        3.30      0.75     0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.719
```

```
  SUBAREA AREA(ACRES) =    4.00      SUBAREA RUNOFF(CFS) =    8.25
  EFFECTIVE AREA(ACRES) =      5.30   AREA-AVERAGED Fm(INCH/HR) =  0.47
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.63
  TOTAL AREA(ACRES) =        5.3       PEAK FLOW RATE(CFS) =      11.25

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 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) =   644.30  DOWNSTREAM(FEET) =   643.50
  FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.68
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.25
  PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =   12.61
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     25.00 =     810.00 FEET.

****************************************************************************
  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.) =   12.61
  RAINFALL INTENSITY(INCH/HR) =   2.78
  AREA-AVERAGED Fm(INCH/HR) =  0.47
  AREA-AVERAGED Fp(INCH/HR) =  0.75
  AREA-AVERAGED Ap =  0.63
  EFFECTIVE STREAM AREA(ACRES) =       5.30
  TOTAL STREAM AREA(ACRES) =       5.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      11.25

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      326.75   18.07    2.239  0.27( 0.27) 1.00     183.2      10.00
      2       11.25   12.61    2.779  0.75( 0.47) 0.63       5.3      20.00

  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      301.78   12.61    2.779  0.28( 0.28) 0.99     133.1      20.00
      2      335.37   18.07    2.239  0.28( 0.28) 0.99     188.5      10.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     335.37    Tc(MIN.) =    18.07
  EFFECTIVE AREA(ACRES) =     188.50   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =      188.5
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     25.00 =    5560.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     25.00 TO NODE     26.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   643.50  DOWNSTREAM(FEET) =   638.20
  FLOW LENGTH(FEET) =   680.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  55.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.27
  ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     335.37
  PIPE TRAVEL TIME(MIN.) =   0.79    Tc(MIN.) =   18.87
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     26.00 =    6240.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     26.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.87
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.182
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.50      0.75     0.100    56
  PUBLIC PARK                B        2.90      0.75     0.850    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.740
  SUBAREA AREA(ACRES) =    3.40      SUBAREA RUNOFF(CFS) =    4.98
  EFFECTIVE AREA(ACRES) =    191.90   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =      191.9       PEAK FLOW RATE(CFS) =     335.37
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     27.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   638.20  DOWNSTREAM(FEET) =   635.20
  FLOW LENGTH(FEET) =   220.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  49.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.72
  ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     335.37
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   19.07
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     27.00 =    6460.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   19.07
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.168
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.50      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    0.94
  EFFECTIVE AREA(ACRES) =    192.40   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      192.4       PEAK FLOW RATE(CFS) =     335.37
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   19.07
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.168
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.10      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.19
  EFFECTIVE AREA(ACRES) =    192.50   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.29  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      192.5       PEAK FLOW RATE(CFS) =     335.37
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 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) =   635.20  DOWNSTREAM(FEET) =   634.80
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  69.0 INCH PIPE IS  56.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.85
  ESTIMATED PIPE DIAMETER(INCH) =  69.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     335.37
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   19.13
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     40.00 =    6505.00 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.) =   19.13
  RAINFALL INTENSITY(INCH/HR) =   2.16
  AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.29
  AREA-AVERAGED Ap =  0.98
  EFFECTIVE STREAM AREA(ACRES) =     192.50
  TOTAL STREAM AREA(ACRES) =     192.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     335.37

****************************************************************************
  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) =   360.00
  ELEVATION DATA: UPSTREAM(FEET) =    639.00  DOWNSTREAM(FEET) =    635.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.349
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.129
  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.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.20      0.75     0.500    56   10.35
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      2.98
  TOTAL AREA(ACRES) =      1.20   PEAK FLOW RATE(CFS) =      2.98

****************************************************************************
  FLOW PROCESS FROM NODE     31.00 TO NODE     32.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   635.50  DOWNSTREAM(FEET) =   634.80
  FLOW LENGTH(FEET) =    95.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.40
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.98
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =   10.71
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     32.00 =     455.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     32.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   10.71
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.065
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.60      0.75     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.60      SUBAREA RUNOFF(CFS) =    1.45
  EFFECTIVE AREA(ACRES) =      1.80   AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        1.8       PEAK FLOW RATE(CFS) =       4.36

****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     32.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.71
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.065
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.40      0.75     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.40      SUBAREA RUNOFF(CFS) =    3.39
  EFFECTIVE AREA(ACRES) =      3.20   AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        3.2       PEAK FLOW RATE(CFS) =       7.75

****************************************************************************
  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) =   634.80  DOWNSTREAM(FEET) =   632.60
  FLOW LENGTH(FEET) =   205.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.41
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.75
  PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =   11.24
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     33.00 =     660.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.24
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.977
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.20      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.52
  EFFECTIVE AREA(ACRES) =      3.40   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        3.4       PEAK FLOW RATE(CFS) =       8.02

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.24
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.977
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.40      0.75     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.40      SUBAREA RUNOFF(CFS) =    3.28
  EFFECTIVE AREA(ACRES) =      4.80   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        4.8       PEAK FLOW RATE(CFS) =      11.30

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     34.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   632.60  DOWNSTREAM(FEET) =   632.30
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.29
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.30
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   11.43
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     34.00 =     720.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.43
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.948
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.00      0.75     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.00      SUBAREA RUNOFF(CFS) =    2.32
```

```
  EFFECTIVE AREA(ACRES) =      5.80   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =      13.49

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     35.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   632.30  DOWNSTREAM(FEET) =   627.50
  FLOW LENGTH(FEET) =   210.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.64
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.49
  PIPE TRAVEL TIME(MIN.) =   0.36    Tc(MIN.) =   11.79
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     35.00 =     930.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     35.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.79
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.893
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        2.40      0.75     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.40      SUBAREA RUNOFF(CFS) =    5.44
  EFFECTIVE AREA(ACRES) =      8.20   AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =        8.2       PEAK FLOW RATE(CFS) =      18.64

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     35.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.79
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.893
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.20      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.51
  EFFECTIVE AREA(ACRES) =      8.40   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        8.4       PEAK FLOW RATE(CFS) =      19.15

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     36.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   627.50  DOWNSTREAM(FEET) =   627.00
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.70
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.15
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   11.98
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     36.00 =    1005.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.98
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.866
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.50      0.75     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.50      SUBAREA RUNOFF(CFS) =    3.36
  EFFECTIVE AREA(ACRES) =      9.90   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        9.9       PEAK FLOW RATE(CFS) =      22.31

****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.98
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.866
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.60      0.75     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.60      SUBAREA RUNOFF(CFS) =    3.59
  EFFECTIVE AREA(ACRES) =     11.50   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       11.5       PEAK FLOW RATE(CFS) =      25.90

****************************************************************************
  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) =   627.00  DOWNSTREAM(FEET) =   626.00
  FLOW LENGTH(FEET) =   460.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  26.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.71
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.90
  PIPE TRAVEL TIME(MIN.) =   1.63    Tc(MIN.) =   13.61
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     37.00 =    1465.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.00 TO NODE     37.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   13.61
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.655
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.80      0.75     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    1.64
  EFFECTIVE AREA(ACRES) =     12.30   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       12.3       PEAK FLOW RATE(CFS) =      25.90
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     37.00 TO NODE     37.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   13.61
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.655
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.10      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.23
  EFFECTIVE AREA(ACRES) =     12.40   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       12.4       PEAK FLOW RATE(CFS) =      25.90
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     37.00 TO NODE     38.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   626.00  DOWNSTREAM(FEET) =   625.50
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.21
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.90
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   13.78
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     38.00 =    1540.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     38.00 TO NODE     38.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   13.78
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.635
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.10      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.23
  EFFECTIVE AREA(ACRES) =     12.50   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       12.5       PEAK FLOW RATE(CFS) =      25.90
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     38.00 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) =   625.50  DOWNSTREAM(FEET) =   625.00
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.21
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.90
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   13.96
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     40.00 =    1615.00 FEET.

****************************************************************************
  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.) =   13.96
  RAINFALL INTENSITY(INCH/HR) =   2.61
  AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.75
```

```
  AREA-AVERAGED Ap =  0.48
  EFFECTIVE STREAM AREA(ACRES) =      12.50
  TOTAL STREAM AREA(ACRES) =      12.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      25.90

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      301.78   13.69    2.645  0.29( 0.29) 0.98     137.1      20.00
      1      335.37   19.13    2.164  0.29( 0.28) 0.98     192.5      10.00
      2       25.90   13.96    2.615  0.75( 0.36) 0.48      12.5      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      327.53   13.69    2.645  0.31( 0.29) 0.93     149.4      20.00
      2      329.32   13.96    2.615  0.31( 0.29) 0.94     152.3      30.00
      3      356.10   19.13    2.164  0.30( 0.29) 0.95     205.0      10.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     356.10    Tc(MIN.) =    19.13
  EFFECTIVE AREA(ACRES) =     205.00   AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =      205.0
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     40.00 =    6505.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     41.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   634.80  DOWNSTREAM(FEET) =   633.30
  FLOW LENGTH(FEET) =   190.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  58.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.39
  ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     356.10
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   19.35
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     41.00 =    6695.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     41.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.35
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.150
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.90      0.75     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.90      SUBAREA RUNOFF(CFS) =    3.04
  EFFECTIVE AREA(ACRES) =    206.90   AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =      206.9       PEAK FLOW RATE(CFS) =     356.10
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     41.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.35
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.150
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        3.60      0.75     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.60      SUBAREA RUNOFF(CFS) =    5.75
  EFFECTIVE AREA(ACRES) =    210.50   AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.31  AREA-AVERAGED Ap =  0.94
  TOTAL AREA(ACRES) =      210.5       PEAK FLOW RATE(CFS) =     356.10
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     55.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   633.30  DOWNSTREAM(FEET) =   633.00
  FLOW LENGTH(FEET) =    15.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  63.0 INCH PIPE IS  46.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.79
  ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     356.10
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   19.36
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     55.00 =    6710.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     55.00 TO NODE     55.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     46.00 TO NODE     47.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   850.00
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   1060.00  DOWNSTREAM(FEET) =    740.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.479
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.298
  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
  "BARREN"                   B        5.70      0.27     1.000    86    9.48
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     15.52
  TOTAL AREA(ACRES) =      5.70   PEAK FLOW RATE(CFS) =     15.52

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     48.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    740.00  DOWNSTREAM(FEET) =    640.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   530.00   CHANNEL SLOPE =  0.1887
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      15.52
  FLOW VELOCITY(FEET/SEC) =   8.86 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.00   Tc(MIN.) =   10.48
  LONGEST FLOWPATH FROM NODE     46.00 TO NODE     48.00 =    1380.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.48
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.106
  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
  "BARREN"                   B        7.90      0.27     1.000    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    7.90      SUBAREA RUNOFF(CFS) =   20.15
  EFFECTIVE AREA(ACRES) =     13.60   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       13.6       PEAK FLOW RATE(CFS) =      34.69

****************************************************************************
  FLOW PROCESS FROM NODE     48.00 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) =   640.00  DOWNSTREAM(FEET) =   633.60
  FLOW LENGTH(FEET) =   360.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.13
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      34.69
  PIPE TRAVEL TIME(MIN.) =   0.54    Tc(MIN.) =   11.02
  LONGEST FLOWPATH FROM NODE     46.00 TO NODE     53.00 =    1740.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     53.00 TO NODE     53.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.02
  RAINFALL INTENSITY(INCH/HR) =   3.01
  AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      13.60
  TOTAL STREAM AREA(ACRES) =      13.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      34.69

****************************************************************************
  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) =   560.00
  ELEVATION DATA: UPSTREAM(FEET) =   1020.00  DOWNSTREAM(FEET) =    810.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.028
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.644
  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
  "BARREN"                   B        1.30      0.27     1.000    86    8.03
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      3.94
  TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      3.94

****************************************************************************
  FLOW PROCESS FROM NODE     51.00 TO NODE     52.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    810.00  DOWNSTREAM(FEET) =    630.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   620.00   CHANNEL SLOPE =  0.2903
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       3.94
  FLOW VELOCITY(FEET/SEC) =   6.31 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

```
  TRAVEL TIME(MIN.) =   1.64   Tc(MIN.) =    9.66
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     52.00 =    1180.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     52.00 TO NODE     52.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.66
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.260
  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
  "BARREN"                   B        6.10      0.27     1.000    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    6.10      SUBAREA RUNOFF(CFS) =   16.40
  EFFECTIVE AREA(ACRES) =      7.40   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        7.4       PEAK FLOW RATE(CFS) =      19.90

****************************************************************************
  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) =   630.00  DOWNSTREAM(FEET) =   629.50
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.67
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.90
  PIPE TRAVEL TIME(MIN.) =   0.35    Tc(MIN.) =   10.02
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     53.00 =    1300.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     53.00 TO NODE     53.00 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.) =   10.02
  RAINFALL INTENSITY(INCH/HR) =   3.19
  AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       7.40
  TOTAL STREAM AREA(ACRES) =       7.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      19.90

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       34.69   11.02    3.014  0.27( 0.27) 1.00      13.6      46.00
      2       19.90   10.02    3.191  0.27( 0.27) 1.00       7.4      50.00

  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       53.48   10.02    3.191  0.27( 0.27) 1.00      19.8      50.00
      2       53.38   11.02    3.014  0.27( 0.27) 1.00      21.0      46.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      53.48    Tc(MIN.) =    10.02
  EFFECTIVE AREA(ACRES) =      19.77   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       21.0
  LONGEST FLOWPATH FROM NODE     46.00 TO NODE     53.00 =    1740.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     53.00 TO NODE     54.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   633.60  DOWNSTREAM(FEET) =   633.30
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.25
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      53.48
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   10.12
  LONGEST FLOWPATH FROM NODE     46.00 TO NODE     54.00 =    1790.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.12
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.171
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        1.30      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.30      SUBAREA RUNOFF(CFS) =    3.62
  EFFECTIVE AREA(ACRES) =     21.07   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.94
  TOTAL AREA(ACRES) =       22.3       PEAK FLOW RATE(CFS) =      55.20

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   10.12
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.171
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        3.90      0.75     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.90      SUBAREA RUNOFF(CFS) =    9.82
  EFFECTIVE AREA(ACRES) =     24.97   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.32  AREA-AVERAGED Ap =  0.88
  TOTAL AREA(ACRES) =       26.2       PEAK FLOW RATE(CFS) =      65.02

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     55.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   633.30  DOWNSTREAM(FEET) =   633.00
  FLOW LENGTH(FEET) =   230.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  54.0 INCH PIPE IS  42.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.83
  ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      65.02
  PIPE TRAVEL TIME(MIN.) =   0.79    Tc(MIN.) =   10.91
  LONGEST FLOWPATH FROM NODE     46.00 TO NODE     55.00 =    2020.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     55.00 TO NODE     55.00 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       65.02   10.91    3.031  0.32( 0.28) 0.88      25.0      50.00
      2       64.13   11.91    2.876  0.31( 0.28) 0.88      26.2      46.00
  LONGEST FLOWPATH FROM NODE     46.00 TO NODE     55.00 =    2020.00 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      327.53   13.92    2.619  0.32( 0.29) 0.92     154.9      20.00
      2      329.32   14.19    2.589  0.32( 0.29) 0.92     157.8      30.00
      3      356.10   19.36    2.149  0.31( 0.29) 0.94     210.5      10.00
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     55.00 =    6710.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      367.26   10.91    3.031  0.32( 0.29) 0.91     146.4      50.00
      2      375.33   11.91    2.876  0.32( 0.29) 0.91     158.7      46.00
      3      385.32   13.92    2.619  0.32( 0.29) 0.91     181.1      20.00
      4      386.38   14.19    2.589  0.32( 0.29) 0.91     184.0      30.00
      5      402.29   19.36    2.149  0.31( 0.29) 0.93     236.7      10.00
    TOTAL AREA(ACRES) =       236.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      402.29  Tc(MIN.) =   19.357
  EFFECTIVE AREA(ACRES) =    236.70  AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.31  AREA-AVERAGED Ap =  0.93
  TOTAL AREA(ACRES) =      236.7
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     55.00 =    6710.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     55.00 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) =   633.00  DOWNSTREAM(FEET) =   632.00
  FLOW LENGTH(FEET) =   520.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN 102.0 INCH PIPE IS  75.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.90
  ESTIMATED PIPE DIAMETER(INCH) = 102.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     402.29
  PIPE TRAVEL TIME(MIN.) =   0.97    Tc(MIN.) =   20.33
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     64.00 =    7230.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     64.00 TO NODE     64.00 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.) =   20.33
  RAINFALL INTENSITY(INCH/HR) =   2.09
  AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.31
  AREA-AVERAGED Ap =  0.93
  EFFECTIVE STREAM AREA(ACRES) =     236.70
  TOTAL STREAM AREA(ACRES) =     236.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     402.29

****************************************************************************
  FLOW PROCESS FROM NODE     55.00 TO NODE     56.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   880.00
  ELEVATION DATA: UPSTREAM(FEET) =    890.00  DOWNSTREAM(FEET) =    630.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.089
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.177
```

```
  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
  "BARREN"                   B        7.10      0.27     1.000    86   10.09
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     18.56
  TOTAL AREA(ACRES) =      7.10   PEAK FLOW RATE(CFS) =     18.56

****************************************************************************
  FLOW PROCESS FROM NODE     56.00 TO NODE     57.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   630.00  DOWNSTREAM(FEET) =   629.00
  FLOW LENGTH(FEET) =   430.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  24.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.36
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      18.56
  PIPE TRAVEL TIME(MIN.) =   1.64    Tc(MIN.) =   11.73
  LONGEST FLOWPATH FROM NODE     55.00 TO NODE     57.00 =    1310.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.73
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.902
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.90      0.75     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.90      SUBAREA RUNOFF(CFS) =    2.05
  EFFECTIVE AREA(ACRES) =      8.00   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.30  AREA-AVERAGED Ap =  0.94
  TOTAL AREA(ACRES) =        8.0       PEAK FLOW RATE(CFS) =      18.85

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     58.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   632.00  DOWNSTREAM(FEET) =   631.50
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.70
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      18.85
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   11.84
  LONGEST FLOWPATH FROM NODE     55.00 TO NODE     58.00 =    1360.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.84
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.886
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        2.00      0.75     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.00      SUBAREA RUNOFF(CFS) =    4.52
  EFFECTIVE AREA(ACRES) =     10.00   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.35  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =       10.0       PEAK FLOW RATE(CFS) =      23.26

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.84
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.886
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.10      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.25
  EFFECTIVE AREA(ACRES) =     10.10   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.35  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =       10.1       PEAK FLOW RATE(CFS) =      23.51

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.84
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.886
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.10      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.25
  EFFECTIVE AREA(ACRES) =     10.20   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.35  AREA-AVERAGED Ap =  0.84
```

```
  TOTAL AREA(ACRES) =       10.2       PEAK FLOW RATE(CFS) =      23.76

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     59.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   631.50  DOWNSTREAM(FEET) =   631.00
  FLOW LENGTH(FEET) =   235.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.60
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      23.76
  PIPE TRAVEL TIME(MIN.) =   0.85    Tc(MIN.) =   12.69
  LONGEST FLOWPATH FROM NODE     55.00 TO NODE     59.00 =    1595.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.00 TO NODE     59.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.69
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.768
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.70      0.75     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.70      SUBAREA RUNOFF(CFS) =    1.51
  EFFECTIVE AREA(ACRES) =     10.90   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.82
  TOTAL AREA(ACRES) =       10.9       PEAK FLOW RATE(CFS) =      24.19

****************************************************************************
  FLOW PROCESS FROM NODE     59.00 TO NODE     60.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   631.00  DOWNSTREAM(FEET) =   630.50
  FLOW LENGTH(FEET) =    65.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.37
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      24.19
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   12.84
  LONGEST FLOWPATH FROM NODE     55.00 TO NODE     60.00 =    1660.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     60.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.84
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.749
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.10      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.24
  EFFECTIVE AREA(ACRES) =     11.00   AREA-AVERAGED Fm(INCH/HR) =  0.30
  AREA-AVERAGED Fp(INCH/HR) =  0.37  AREA-AVERAGED Ap =  0.81
  TOTAL AREA(ACRES) =       11.0       PEAK FLOW RATE(CFS) =      24.24

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     60.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.84
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.749
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.00      0.75     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.00      SUBAREA RUNOFF(CFS) =    2.14
  EFFECTIVE AREA(ACRES) =     12.00   AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.39  AREA-AVERAGED Ap =  0.79
  TOTAL AREA(ACRES) =       12.0       PEAK FLOW RATE(CFS) =      26.38

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     61.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   630.50  DOWNSTREAM(FEET) =   630.00
  FLOW LENGTH(FEET) =   200.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.01
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.38
  PIPE TRAVEL TIME(MIN.) =   0.67    Tc(MIN.) =   13.51
  LONGEST FLOWPATH FROM NODE     55.00 TO NODE     61.00 =    1860.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.51
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.667
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```

```
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.60      0.75     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.60      SUBAREA RUNOFF(CFS) =    3.30
  EFFECTIVE AREA(ACRES) =     13.60   AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.75
  TOTAL AREA(ACRES) =       13.6       PEAK FLOW RATE(CFS) =      28.80

****************************************************************************
  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) =   630.00  DOWNSTREAM(FEET) =   629.80
  FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.92
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      28.80
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   13.56
  LONGEST FLOWPATH FROM NODE     55.00 TO NODE     62.00 =    1885.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     62.00 TO NODE     62.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.56
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.661
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.20      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.47
  EFFECTIVE AREA(ACRES) =     13.80   AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.74
  TOTAL AREA(ACRES) =       13.8       PEAK FLOW RATE(CFS) =      29.19

****************************************************************************
  FLOW PROCESS FROM NODE     62.00 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) =   629.80  DOWNSTREAM(FEET) =   629.50
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  24.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.06
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      29.19
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =   13.76
  LONGEST FLOWPATH FROM NODE     55.00 TO NODE     64.00 =    1960.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     64.00 TO NODE     64.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.76
  RAINFALL INTENSITY(INCH/HR) =   2.64
  AREA-AVERAGED Fm(INCH/HR) =  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.42
  AREA-AVERAGED Ap =  0.74
  EFFECTIVE STREAM AREA(ACRES) =      13.80
  TOTAL STREAM AREA(ACRES) =      13.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      29.19

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      367.26   11.92    2.874  0.32( 0.29) 0.91     146.4      50.00
      1      375.33   12.92    2.739  0.32( 0.29) 0.91     158.7      46.00
      1      385.32   14.90    2.514  0.32( 0.29) 0.91     181.1      20.00
      1      386.38   15.17    2.487  0.32( 0.29) 0.91     184.0      30.00
      1      402.29   20.33    2.087  0.31( 0.29) 0.93     236.7      10.00
      2       29.19   13.76    2.637  0.42( 0.31) 0.74      13.8      55.00

  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      395.12   11.92    2.874  0.33( 0.29) 0.90     158.3      50.00
      2      403.93   12.92    2.739  0.33( 0.29) 0.90     171.7      46.00
      3      408.78   13.76    2.637  0.33( 0.29) 0.90     182.0      55.00
      4      412.96   14.90    2.514  0.33( 0.29) 0.90     194.9      20.00
      5      413.70   15.17    2.487  0.33( 0.29) 0.90     197.8      30.00
      6      424.58   20.33    2.087  0.31( 0.29) 0.92     250.5      10.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     424.58    Tc(MIN.) =    20.33
  EFFECTIVE AREA(ACRES) =     250.50   AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.31  AREA-AVERAGED Ap =  0.92
  TOTAL AREA(ACRES) =      250.5
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     64.00 =    7230.00 FEET.

****************************************************************************
  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) =   629.50  DOWNSTREAM(FEET) =   574.00
```

```
  FLOW LENGTH(FEET) =   350.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  34.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  46.98
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     424.58
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   20.46
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     65.00 =    7580.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     65.00 TO NODE     66.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    574.00  DOWNSTREAM(FEET) =    573.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   130.00   CHANNEL SLOPE =  0.0077
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =  10.00
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.058
  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
  "OPEN BRUSH"                B        4.20      0.61     1.000    66
  NATURAL POOR COVER
  "BARREN"                    B        5.60      0.27     1.000    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     431.81
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   6.22
  AVERAGE FLOW DEPTH(FEET) =   2.73   TRAVEL TIME(MIN.) =   0.35
  Tc(MIN.) =   20.80
  SUBAREA AREA(ACRES) =     9.80       SUBAREA RUNOFF(CFS) =   14.46
  EFFECTIVE AREA(ACRES) =    260.30     AREA-AVERAGED Fm(INCH/HR) =   0.29
  AREA-AVERAGED Fp(INCH/HR) =   0.32  AREA-AVERAGED Ap =   0.93
  TOTAL AREA(ACRES) =      260.3         PEAK FLOW RATE(CFS) =     424.58
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  2.70   FLOW VELOCITY(FEET/SEC.) =   6.18
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     66.00 =    7710.00 FEET.

****************************************************************************
  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) =   270.00
  ELEVATION DATA: UPSTREAM(FEET) =    645.20  DOWNSTREAM(FEET) =    642.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.661
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.913
  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.)
  PUBLIC PARK                 B        1.00      0.75     0.850    56   11.66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      2.05
  TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      2.05

****************************************************************************
  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) =   642.80  DOWNSTREAM(FEET) =   640.00
  FLOW LENGTH(FEET) =   240.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.69
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.05
  PIPE TRAVEL TIME(MIN.) =   0.85    Tc(MIN.) =   12.51
  LONGEST FLOWPATH FROM NODE     70.00 TO NODE     72.00 =     510.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     72.00 TO NODE     72.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.51
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.792
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        1.10      0.75     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.10      SUBAREA RUNOFF(CFS) =    2.39
  EFFECTIVE AREA(ACRES) =      2.10   AREA-AVERAGED Fm(INCH/HR) =  0.50
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.67
  TOTAL AREA(ACRES) =        2.1       PEAK FLOW RATE(CFS) =       4.33

****************************************************************************
  FLOW PROCESS FROM NODE     72.00 TO NODE     73.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   640.00  DOWNSTREAM(FEET) =   634.40
  FLOW LENGTH(FEET) =    90.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.56
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.33
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   12.66
```

```
  LONGEST FLOWPATH FROM NODE     70.00 TO NODE     73.00 =     600.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     73.00 TO NODE     73.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.66
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.773
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.20      0.75     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    2.59
  EFFECTIVE AREA(ACRES) =      3.30   AREA-AVERAGED Fm(INCH/HR) =  0.45
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.61
  TOTAL AREA(ACRES) =        3.3       PEAK FLOW RATE(CFS) =       6.89

****************************************************************************
  FLOW PROCESS FROM NODE     73.00 TO NODE     73.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.66
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.773
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.90      0.75     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.90      SUBAREA RUNOFF(CFS) =    4.10
  EFFECTIVE AREA(ACRES) =      5.20   AREA-AVERAGED Fm(INCH/HR) =  0.42
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.57
  TOTAL AREA(ACRES) =        5.2       PEAK FLOW RATE(CFS) =      10.99

****************************************************************************
  FLOW PROCESS FROM NODE     73.00 TO NODE     74.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   634.40  DOWNSTREAM(FEET) =   628.30
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH)  INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.34
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.99
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   12.72
  LONGEST FLOWPATH FROM NODE     70.00 TO NODE     74.00 =     660.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     74.00 TO NODE     74.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.72
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.765
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.50      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    1.21
  EFFECTIVE AREA(ACRES) =      5.70   AREA-AVERAGED Fm(INCH/HR) =  0.39
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.53
  TOTAL AREA(ACRES) =        5.7       PEAK FLOW RATE(CFS) =      12.16

****************************************************************************
  FLOW PROCESS FROM NODE     74.00 TO NODE     75.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   628.30  DOWNSTREAM(FEET) =   618.50
  FLOW LENGTH(FEET) =   105.00   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.) =  16.27
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.16
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   12.82
  LONGEST FLOWPATH FROM NODE     70.00 TO NODE     75.00 =     765.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     75.00 TO NODE     75.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.82
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.751
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.90      0.75     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.90      SUBAREA RUNOFF(CFS) =    1.93
  EFFECTIVE AREA(ACRES) =      6.60   AREA-AVERAGED Fm(INCH/HR) =  0.39
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =        6.6       PEAK FLOW RATE(CFS) =      14.02

****************************************************************************
  FLOW PROCESS FROM NODE     75.00 TO NODE     75.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   12.82
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.751
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.40      0.75     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    0.86
  EFFECTIVE AREA(ACRES) =      7.00   AREA-AVERAGED Fm(INCH/HR) =  0.39
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =        7.0       PEAK FLOW RATE(CFS) =      14.87

****************************************************************************
  FLOW PROCESS FROM NODE     75.00 TO NODE     76.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   618.50  DOWNSTREAM(FEET) =   605.00
  FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.09
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.87
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   12.94
  LONGEST FLOWPATH FROM NODE     70.00 TO NODE     76.00 =     890.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     76.00 TO NODE     76.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   12.94
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.736
  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
  "OPEN BRUSH"               B        0.80      0.61     1.000    66
  COMMERCIAL                 B        0.40      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.62
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.700
  SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    2.49
  EFFECTIVE AREA(ACRES) =      8.20   AREA-AVERAGED Fm(INCH/HR) =  0.40
  AREA-AVERAGED Fp(INCH/HR) =  0.72  AREA-AVERAGED Ap =  0.55
  TOTAL AREA(ACRES) =        8.2       PEAK FLOW RATE(CFS) =      17.27

****************************************************************************
  FLOW PROCESS FROM NODE     76.00 TO NODE     76.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   12.94
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.736
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.20      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.48
  EFFECTIVE AREA(ACRES) =      8.40   AREA-AVERAGED Fm(INCH/HR) =  0.39
  AREA-AVERAGED Fp(INCH/HR) =  0.72  AREA-AVERAGED Ap =  0.54
  TOTAL AREA(ACRES) =        8.4       PEAK FLOW RATE(CFS) =      17.75

****************************************************************************
  FLOW PROCESS FROM NODE     76.00 TO NODE     94.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   605.00  DOWNSTREAM(FEET) =   565.00
  FLOW LENGTH(FEET) =  1100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.22
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.75
  PIPE TRAVEL TIME(MIN.) =   1.50    Tc(MIN.) =   14.44
  LONGEST FLOWPATH FROM NODE     70.00 TO NODE     94.00 =    1990.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     94.00 TO NODE     94.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   14.44
  RAINFALL INTENSITY(INCH/HR) =   2.56
  AREA-AVERAGED Fm(INCH/HR) =  0.39
  AREA-AVERAGED Fp(INCH/HR) =  0.72
  AREA-AVERAGED Ap =  0.54
  EFFECTIVE STREAM AREA(ACRES) =       8.40
  TOTAL STREAM AREA(ACRES) =       8.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      17.75

****************************************************************************
  FLOW PROCESS FROM NODE     80.00 TO NODE     81.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   450.00
  ELEVATION DATA: UPSTREAM(FEET) =    629.10  DOWNSTREAM(FEET) =    624.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.155
```

```
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.991
  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.)
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.20      0.75     0.500    56   11.15
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      2.83
  TOTAL AREA(ACRES) =      1.20   PEAK FLOW RATE(CFS) =      2.83

****************************************************************************
  FLOW PROCESS FROM NODE     81.00 TO NODE     82.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   624.40  DOWNSTREAM(FEET) =   624.00
  FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.75
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.83
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   11.23
  LONGEST FLOWPATH FROM NODE     80.00 TO NODE     82.00 =     475.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     82.00 TO NODE     82.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.23
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.980
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.20      0.75     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    2.81
  EFFECTIVE AREA(ACRES) =      2.40   AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        2.4       PEAK FLOW RATE(CFS) =       5.63

****************************************************************************
  FLOW PROCESS FROM NODE     82.00 TO NODE     88.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   624.00  DOWNSTREAM(FEET) =   623.40
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.33
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.63
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   11.46
  LONGEST FLOWPATH FROM NODE     80.00 TO NODE     88.00 =     550.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     88.00 TO NODE     88.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.46
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.943
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.70      0.75     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.70      SUBAREA RUNOFF(CFS) =    1.62
  EFFECTIVE AREA(ACRES) =      3.10   AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =       7.17

****************************************************************************
  FLOW PROCESS FROM NODE     88.00 TO NODE     88.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.46
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.943
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.20      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.52
  EFFECTIVE AREA(ACRES) =      3.30   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        3.3       PEAK FLOW RATE(CFS) =       7.68

****************************************************************************
  FLOW PROCESS FROM NODE     88.00 TO NODE     89.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   623.40  DOWNSTREAM(FEET) =   620.90
  FLOW LENGTH(FEET) =   260.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.12
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.68
  PIPE TRAVEL TIME(MIN.) =   0.71    Tc(MIN.) =   12.17
  LONGEST FLOWPATH FROM NODE     80.00 TO NODE     89.00 =     810.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     89.00 TO NODE     89.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.17
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.839
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.90      0.75     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.90      SUBAREA RUNOFF(CFS) =    2.00
  EFFECTIVE AREA(ACRES) =      4.20   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        4.2       PEAK FLOW RATE(CFS) =       9.37

****************************************************************************
  FLOW PROCESS FROM NODE     89.00 TO NODE     90.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   620.90  DOWNSTREAM(FEET) =   620.20
  FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.41
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.37
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   12.35
  LONGEST FLOWPATH FROM NODE     80.00 TO NODE     90.00 =     880.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     90.00 TO NODE     90.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.35
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.814
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.60      0.75     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.60      SUBAREA RUNOFF(CFS) =    1.32
  EFFECTIVE AREA(ACRES) =      4.80   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        4.8       PEAK FLOW RATE(CFS) =      10.59

****************************************************************************
  FLOW PROCESS FROM NODE     90.00 TO NODE     90.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.35
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.814
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.80      0.75     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    1.76
  EFFECTIVE AREA(ACRES) =      5.60   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =        5.6       PEAK FLOW RATE(CFS) =      12.35

****************************************************************************
  FLOW PROCESS FROM NODE     90.00 TO NODE     91.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   620.20  DOWNSTREAM(FEET) =   618.00
  FLOW LENGTH(FEET) =   220.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.98
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.35
  PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =   12.88
  LONGEST FLOWPATH FROM NODE     80.00 TO NODE     91.00 =    1100.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     91.00 TO NODE     91.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.88
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.744
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.80      0.75     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    1.71
  EFFECTIVE AREA(ACRES) =      6.40   AREA-AVERAGED Fm(INCH/HR) =  0.36
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =        6.4       PEAK FLOW RATE(CFS) =      13.71

****************************************************************************
  FLOW PROCESS FROM NODE     91.00 TO NODE     92.00 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) =   617.50
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  17.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.50
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.71
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   13.03
  LONGEST FLOWPATH FROM NODE     80.00 TO NODE     92.00 =    1160.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     92.00 TO NODE     92.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   13.03
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.725
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        3.20      0.75     0.500    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.20      SUBAREA RUNOFF(CFS) =    6.77
  EFFECTIVE AREA(ACRES) =      9.60   AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =        9.6       PEAK FLOW RATE(CFS) =      20.37

****************************************************************************
  FLOW PROCESS FROM NODE     92.00 TO NODE     94.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   617.50  DOWNSTREAM(FEET) =   565.00
  FLOW LENGTH(FEET) =   400.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.04
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      20.37
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   13.35
  LONGEST FLOWPATH FROM NODE     80.00 TO NODE     94.00 =    1560.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     94.00 TO NODE     94.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.35
  RAINFALL INTENSITY(INCH/HR) =   2.69
  AREA-AVERAGED Fm(INCH/HR) =  0.37
  AREA-AVERAGED Fp(INCH/HR) =  0.75
  AREA-AVERAGED Ap =  0.49
  EFFECTIVE STREAM AREA(ACRES) =       9.60
  TOTAL STREAM AREA(ACRES) =       9.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      20.37

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       17.75   14.44    2.562  0.72( 0.39) 0.54       8.4      70.00
      2       20.37   13.35    2.686  0.75( 0.37) 0.49       9.6      80.00

  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       37.70   13.35    2.686  0.74( 0.38) 0.51      17.4      80.00
      2       37.02   14.44    2.562  0.74( 0.38) 0.51      18.0      70.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      37.70    Tc(MIN.) =    13.35
  EFFECTIVE AREA(ACRES) =      17.36   AREA-AVERAGED Fm(INCH/HR) =  0.38
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =       18.0
  LONGEST FLOWPATH FROM NODE     70.00 TO NODE     94.00 =    1990.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     94.00 TO NODE     95.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   565.00  DOWNSTREAM(FEET) =   561.00
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.88
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      37.70
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   13.38
  LONGEST FLOWPATH FROM NODE     70.00 TO NODE     95.00 =    2035.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     95.00 TO NODE     95.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   13.38
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.682
  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
  "OPEN BRUSH"               B        3.50      0.61     1.000    66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.61
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.50      SUBAREA RUNOFF(CFS) =    6.51
  EFFECTIVE AREA(ACRES) =     20.86   AREA-AVERAGED Fm(INCH/HR) =  0.42
  AREA-AVERAGED Fp(INCH/HR) =  0.70  AREA-AVERAGED Ap =  0.59
  TOTAL AREA(ACRES) =       21.5       PEAK FLOW RATE(CFS) =      42.52

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   865.00
  ELEVATION DATA: UPSTREAM(FEET) =    830.00  DOWNSTREAM(FEET) =    640.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.632
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.079
  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
  "BARREN"                    B        3.40      0.27     1.000    86   10.63
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      8.59
  TOTAL AREA(ACRES) =      3.40   PEAK FLOW RATE(CFS) =      8.59

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    640.00  DOWNSTREAM(FEET) =    630.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   230.00   CHANNEL SLOPE =  0.0435
  CHANNEL FLOW THRU SUBAREA(CFS) =       8.59
  FLOW VELOCITY(FEET/SEC) =   5.02 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.76   Tc(MIN.) =   11.40
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =    1095.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.40
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.953
  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
  "BARREN"                    B        2.60      0.27     1.000    86
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.60      SUBAREA RUNOFF(CFS) =    6.27
  EFFECTIVE AREA(ACRES) =      6.00   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        6.0       PEAK FLOW RATE(CFS) =      14.48

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   630.00  DOWNSTREAM(FEET) =   628.00
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.96
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.48
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   11.72
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =    1250.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.72
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.904
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.20      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.51
  EFFECTIVE AREA(ACRES) =      6.20   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =        6.2       PEAK FLOW RATE(CFS) =      14.72

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.72
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.904
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.20      0.75     0.100    56
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.51
  EFFECTIVE AREA(ACRES) =      6.40   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.28  AREA-AVERAGED Ap =  0.94
  TOTAL AREA(ACRES) =        6.4       PEAK FLOW RATE(CFS) =      15.23

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

```
  FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   628.00  DOWNSTREAM(FEET) =   627.50
  FLOW LENGTH(FEET) =   190.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  19.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.48
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      15.23
  PIPE TRAVEL TIME(MIN.) =   0.71    Tc(MIN.) =   12.43
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =    1440.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.43
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.803
  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
  "OPEN BRUSH"               B        0.60      0.61     1.000    66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.61
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    0.60      SUBAREA RUNOFF(CFS) =    1.18
  EFFECTIVE AREA(ACRES) =      7.00   AREA-AVERAGED Fm(INCH/HR) =  0.29
  AREA-AVERAGED Fp(INCH/HR) =  0.31  AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =        7.0       PEAK FLOW RATE(CFS) =      15.83

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   627.50  DOWNSTREAM(FEET) =   615.00
  FLOW LENGTH(FEET) =   320.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS   9.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.44
  GIVEN PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      15.83
  PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =   12.86
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =    1760.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.86
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.747
  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
  "OPEN BRUSH"               B        0.80      0.61     1.000    66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.61
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    1.54
  EFFECTIVE AREA(ACRES) =      7.80   AREA-AVERAGED Fm(INCH/HR) =  0.32
  AREA-AVERAGED Fp(INCH/HR) =  0.34  AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =        7.8       PEAK FLOW RATE(CFS) =      17.01

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    111.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   185.00
  ELEVATION DATA: UPSTREAM(FEET) =    620.00  DOWNSTREAM(FEET) =    555.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.023
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.948
  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
  "OPEN BRUSH"               B        0.80      0.61     1.000    66    7.02
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.61
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.40
  TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      2.40

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    121.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   650.00
  ELEVATION DATA: UPSTREAM(FEET) =    625.00  DOWNSTREAM(FEET) =    565.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.168
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.488
  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
  "OPEN BRUSH"               B        1.10      0.61     1.000    66   15.17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.61
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.85
  TOTAL AREA(ACRES) =      1.10   PEAK FLOW RATE(CFS) =      1.85
============================================================================
  END OF STUDY SUMMARY:
```

```
  TOTAL AREA(ACRES)     =        1.1  TC(MIN.) =     15.17
  EFFECTIVE AREA(ACRES) =      1.10  AREA-AVERAGED Fm(INCH/HR)=  0.61
  AREA-AVERAGED Fp(INCH/HR) =  0.61  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =       1.85
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
____________________________________________________________________________
****************************************************************************
             RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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                           Analysis prepared by:

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 ************************* DESCRIPTION OF STUDY *************************
* Hydrology Study for VTTM 20317 - Shady View Project                    *
* In the City of Chino Hills, San Bernardino County                      *
* Proposed Condition, 100-year Storm                                     *
 ************************************************************************

  FILE NAME: 20317P.DAT
  TIME/DATE OF STUDY: 15:57 03/24/2020
============================================================================
  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 = 0.90
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.6000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 1.4300

  *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   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 =  0.50 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) =   905.00
  ELEVATION DATA: UPSTREAM(FEET) =   1100.00  DOWNSTREAM(FEET) =    965.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.697
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.814
  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
  "BARREN"                   B        9.40      0.11     1.000    97   11.70
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.11
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     31.37
  TOTAL AREA(ACRES) =      9.40   PEAK FLOW RATE(CFS) =     31.37

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    965.00  DOWNSTREAM(FEET) =    905.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   675.00   CHANNEL SLOPE =  0.0889
  CHANNEL FLOW THRU SUBAREA(CFS) =      31.37
  FLOW VELOCITY(FEET/SEC) =  10.11 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.11   Tc(MIN.) =   12.81
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =    1580.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.81
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.612
  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
  "BARREN"                   B       17.90      0.11     1.000    97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.11
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   17.90      SUBAREA RUNOFF(CFS) =   56.47
  EFFECTIVE AREA(ACRES) =     27.30   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.11  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       27.3       PEAK FLOW RATE(CFS) =      86.13

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
```

```
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    905.00  DOWNSTREAM(FEET) =    804.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1235.00   CHANNEL SLOPE =  0.0818
  CHANNEL FLOW THRU SUBAREA(CFS) =      86.13
  FLOW VELOCITY(FEET/SEC) =  12.98 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.59   Tc(MIN.) =   14.40
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =    2815.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   14.40
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.367
  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
  "BARREN"                   B       32.10      0.11     1.000    97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.11
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   32.10      SUBAREA RUNOFF(CFS) =   94.22
  EFFECTIVE AREA(ACRES) =     59.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.11  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       59.4       PEAK FLOW RATE(CFS) =     174.35

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     14.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    804.00  DOWNSTREAM(FEET) =    725.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1325.00   CHANNEL SLOPE =  0.0596
  CHANNEL FLOW THRU SUBAREA(CFS) =     174.35
  FLOW VELOCITY(FEET/SEC) =  13.73 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.61   Tc(MIN.) =   16.00
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     14.00 =    4140.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   16.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.160
  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
  "BARREN"                   B       27.40      0.11     1.000    97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.11
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   27.40      SUBAREA RUNOFF(CFS) =   75.31
  EFFECTIVE AREA(ACRES) =     86.80   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.11  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       86.8       PEAK FLOW RATE(CFS) =     238.58

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    725.00  DOWNSTREAM(FEET) =    704.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   365.00   CHANNEL SLOPE =  0.0575
  CHANNEL FLOW THRU SUBAREA(CFS) =     238.58
  FLOW VELOCITY(FEET/SEC) =  14.86 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.41   Tc(MIN.) =   16.41
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     15.00 =    4505.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     15.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   16.41
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.112
  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
  "BARREN"                   B       63.60      0.11     1.000    97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.11
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   63.60      SUBAREA RUNOFF(CFS) =  172.09
  EFFECTIVE AREA(ACRES) =    150.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.11  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      150.4       PEAK FLOW RATE(CFS) =     406.95

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE     16.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    704.00  DOWNSTREAM(FEET) =    650.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   900.00   CHANNEL SLOPE =  0.0600
  CHANNEL FLOW THRU SUBAREA(CFS) =     406.95
  FLOW VELOCITY(FEET/SEC) =  17.96 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.84   Tc(MIN.) =   17.25
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     16.00 =    5405.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   17.25
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.021
  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
  "BARREN"                   B       32.80      0.11     1.000    97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.11
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   32.80      SUBAREA RUNOFF(CFS) =   86.05
  EFFECTIVE AREA(ACRES) =    183.20   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.11  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      183.2       PEAK FLOW RATE(CFS) =     480.64

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     35.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   650.00  DOWNSTREAM(FEET) =   649.00
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  84.0 INCH PIPE IS  67.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.42
  ESTIMATED PIPE DIAMETER(INCH) =  84.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     480.64
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   17.43
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     35.00 =    5560.00 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.) =   17.43
  RAINFALL INTENSITY(INCH/HR) =   3.00
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.11
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =     183.20
  TOTAL STREAM AREA(ACRES) =     183.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     480.64

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   540.00
  ELEVATION DATA: UPSTREAM(FEET) =    650.60  DOWNSTREAM(FEET) =    645.20

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.637
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.826
  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
  "8-10 DWELLINGS/ACRE"      B        1.10      0.42     0.400    76   11.64
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.400
  SUBAREA RUNOFF(CFS) =      3.62
  TOTAL AREA(ACRES) =      1.10   PEAK FLOW RATE(CFS) =      3.62

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   645.20  DOWNSTREAM(FEET) =   644.30
  FLOW LENGTH(FEET) =   145.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.35
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.62
  PIPE TRAVEL TIME(MIN.) =   0.56    Tc(MIN.) =   12.19
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     22.00 =     685.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.19
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.720
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.20      0.42     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.66
  EFFECTIVE AREA(ACRES) =      1.30   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.35
  TOTAL AREA(ACRES) =        1.3       PEAK FLOW RATE(CFS) =       4.18

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.19
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.720
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.70      0.42     0.100    76
  PUBLIC PARK                B        3.30      0.42     0.850    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.719
```

```
  SUBAREA AREA(ACRES) =    4.00      SUBAREA RUNOFF(CFS) =   12.30
  EFFECTIVE AREA(ACRES) =      5.30   AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.63
  TOTAL AREA(ACRES) =        5.3       PEAK FLOW RATE(CFS) =      16.48

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 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) =   644.30  DOWNSTREAM(FEET) =   643.50
  FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.22
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.48
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =   12.53
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     25.00 =     810.00 FEET.

****************************************************************************
  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.) =   12.53
  RAINFALL INTENSITY(INCH/HR) =   3.66
  AREA-AVERAGED Fm(INCH/HR) =  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.42
  AREA-AVERAGED Ap =  0.63
  EFFECTIVE STREAM AREA(ACRES) =       5.30
  TOTAL STREAM AREA(ACRES) =       5.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      16.48

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      480.64   17.43    3.002  0.11( 0.11) 1.00     183.2      10.00
      2       16.48   12.53    3.660  0.42( 0.27) 0.63       5.3      20.00

  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      440.42   12.53    3.660  0.11( 0.11) 0.99     137.0      20.00
      2      493.93   17.43    3.002  0.11( 0.11) 0.99     188.5      10.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     493.93    Tc(MIN.) =    17.43
  EFFECTIVE AREA(ACRES) =     188.50   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.11  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =      188.5
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     25.00 =    5560.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     25.00 TO NODE     26.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   643.50  DOWNSTREAM(FEET) =   638.20
  FLOW LENGTH(FEET) =   680.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  84.0 INCH PIPE IS  63.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.78
  ESTIMATED PIPE DIAMETER(INCH) =  84.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     493.93
  PIPE TRAVEL TIME(MIN.) =   0.72    Tc(MIN.) =   18.15
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     26.00 =    6240.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     26.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.15
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.931
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.50      0.42     0.100    76
  PUBLIC PARK                B        2.90      0.42     0.850    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.740
  SUBAREA AREA(ACRES) =    3.40      SUBAREA RUNOFF(CFS) =    8.01
  EFFECTIVE AREA(ACRES) =    191.90   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.12  AREA-AVERAGED Ap =  0.99
  TOTAL AREA(ACRES) =      191.9       PEAK FLOW RATE(CFS) =     493.93
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE     27.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   638.20  DOWNSTREAM(FEET) =   635.20
  FLOW LENGTH(FEET) =   220.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  75.0 INCH PIPE IS  58.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.39
  ESTIMATED PIPE DIAMETER(INCH) =  75.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     493.93
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   18.34
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     27.00 =    6460.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   18.34
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.912
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.50      0.42     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    1.29
  EFFECTIVE AREA(ACRES) =    192.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.12  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      192.4       PEAK FLOW RATE(CFS) =     493.93
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   18.34
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.912
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.10      0.42     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.26
  EFFECTIVE AREA(ACRES) =    192.50   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.12  AREA-AVERAGED Ap =  0.98
  TOTAL AREA(ACRES) =      192.5       PEAK FLOW RATE(CFS) =     493.93
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 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) =   635.20  DOWNSTREAM(FEET) =   634.80
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  81.0 INCH PIPE IS  63.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.49
  ESTIMATED PIPE DIAMETER(INCH) =  81.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     493.93
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   18.38
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     40.00 =    6505.00 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.) =   18.38
  RAINFALL INTENSITY(INCH/HR) =   2.91
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.12
  AREA-AVERAGED Ap =  0.98
  EFFECTIVE STREAM AREA(ACRES) =     192.50
  TOTAL STREAM AREA(ACRES) =     192.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     493.93

****************************************************************************
  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) =   360.00
  ELEVATION DATA: UPSTREAM(FEET) =    639.00  DOWNSTREAM(FEET) =    635.50

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.349
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.105
  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
  "5-7 DWELLINGS/ACRE"       B        1.20      0.42     0.500    76   10.35
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      4.20
  TOTAL AREA(ACRES) =      1.20   PEAK FLOW RATE(CFS) =      4.20

****************************************************************************
  FLOW PROCESS FROM NODE     31.00 TO NODE     32.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   635.50  DOWNSTREAM(FEET) =   634.80
  FLOW LENGTH(FEET) =    95.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.82
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.20
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =   10.68
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     32.00 =     455.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     32.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   10.68
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.028
  SUBAREA LOSS RATE DATA(AMC III):
```

```
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.60      0.42     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.60      SUBAREA RUNOFF(CFS) =    2.06
  EFFECTIVE AREA(ACRES) =      1.80   AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        1.8       PEAK FLOW RATE(CFS) =       6.18

****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     32.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.68
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.028
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.40      0.42     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.40      SUBAREA RUNOFF(CFS) =    4.81
  EFFECTIVE AREA(ACRES) =      3.20   AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        3.2       PEAK FLOW RATE(CFS) =      10.99

****************************************************************************
  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) =   634.80  DOWNSTREAM(FEET) =   632.60
  FLOW LENGTH(FEET) =   205.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.02
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.99
  PIPE TRAVEL TIME(MIN.) =   0.49    Tc(MIN.) =   11.17
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     33.00 =     660.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.17
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.922
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.20      0.42     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.70
  EFFECTIVE AREA(ACRES) =      3.40   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        3.4       PEAK FLOW RATE(CFS) =      11.38

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     33.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.17
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.922
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.40      0.42     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.40      SUBAREA RUNOFF(CFS) =    4.68
  EFFECTIVE AREA(ACRES) =      4.80   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        4.8       PEAK FLOW RATE(CFS) =      16.06

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE     34.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   632.60  DOWNSTREAM(FEET) =   632.30
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.77
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.06
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   11.34
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     34.00 =     720.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     34.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.34
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.886
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.00      0.42     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.00      SUBAREA RUNOFF(CFS) =    3.31
```

```
  EFFECTIVE AREA(ACRES) =      5.80   AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =        5.8       PEAK FLOW RATE(CFS) =      19.21

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     35.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   632.30  DOWNSTREAM(FEET) =   627.50
  FLOW LENGTH(FEET) =   210.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.60
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.21
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =   11.67
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     35.00 =     930.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     35.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.67
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.820
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        2.40      0.42     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.40      SUBAREA RUNOFF(CFS) =    7.79
  EFFECTIVE AREA(ACRES) =      8.20   AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =        8.2       PEAK FLOW RATE(CFS) =      26.66

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     35.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.67
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.820
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.20      0.42     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.68
  EFFECTIVE AREA(ACRES) =      8.40   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        8.4       PEAK FLOW RATE(CFS) =      27.34

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE     36.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   627.50  DOWNSTREAM(FEET) =   627.00
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.28
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      27.34
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   11.84
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     36.00 =    1005.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.84
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.786
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.50      0.42     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.50      SUBAREA RUNOFF(CFS) =    4.83
  EFFECTIVE AREA(ACRES) =      9.90   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        9.9       PEAK FLOW RATE(CFS) =      31.91

****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     36.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.84
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.786
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.60      0.42     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.60      SUBAREA RUNOFF(CFS) =    5.15
  EFFECTIVE AREA(ACRES) =     11.50   AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       11.5       PEAK FLOW RATE(CFS) =      37.06

****************************************************************************
  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) =   627.00  DOWNSTREAM(FEET) =   626.00
  FLOW LENGTH(FEET) =   460.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  29.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.17
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      37.06
  PIPE TRAVEL TIME(MIN.) =   1.48    Tc(MIN.) =   13.32
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     37.00 =    1465.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.00 TO NODE     37.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   13.32
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.528
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.80      0.42     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    2.39
  EFFECTIVE AREA(ACRES) =     12.30   AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =       12.3       PEAK FLOW RATE(CFS) =      37.06
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     37.00 TO NODE     37.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   13.32
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.528
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.10      0.42     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.31
  EFFECTIVE AREA(ACRES) =     12.40   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       12.4       PEAK FLOW RATE(CFS) =      37.08

****************************************************************************
  FLOW PROCESS FROM NODE     37.00 TO NODE     38.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   626.00  DOWNSTREAM(FEET) =   625.50
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  24.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.81
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      37.08
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   13.48
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     38.00 =    1540.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     38.00 TO NODE     38.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  MAINLINE Tc(MIN.) =   13.48
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.502
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.10      0.42     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.31
  EFFECTIVE AREA(ACRES) =     12.50   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =       12.5       PEAK FLOW RATE(CFS) =      37.11

****************************************************************************
  FLOW PROCESS FROM NODE     38.00 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) =   625.50  DOWNSTREAM(FEET) =   625.00
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  24.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.81
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      37.11
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   13.64
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     40.00 =    1615.00 FEET.

****************************************************************************
  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.) =   13.64
  RAINFALL INTENSITY(INCH/HR) =   3.48
  AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.42
  AREA-AVERAGED Ap =  0.48
  EFFECTIVE STREAM AREA(ACRES) =      12.50
```

```
  TOTAL STREAM AREA(ACRES) =      12.50
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      37.11

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      440.42   13.51    3.499  0.12( 0.12) 0.98     141.0      20.00
      1      493.93   18.38    2.908  0.12( 0.11) 0.98     192.5      10.00
      2       37.11   13.64    3.478  0.42( 0.20) 0.48      12.5      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      477.40   13.51    3.499  0.13( 0.12) 0.94     153.4      20.00
      2      479.03   13.64    3.478  0.13( 0.12) 0.94     154.9      30.00
      3      524.58   18.38    2.908  0.13( 0.12) 0.95     205.0      10.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     524.58    Tc(MIN.) =    18.38
  EFFECTIVE AREA(ACRES) =     205.00   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.13  AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =      205.0
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     40.00 =    6505.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     41.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   634.80  DOWNSTREAM(FEET) =   633.30
  FLOW LENGTH(FEET) =   190.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  84.0 INCH PIPE IS  67.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.95
  ESTIMATED PIPE DIAMETER(INCH) =  84.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     524.58
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   18.58
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     41.00 =    6695.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     41.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.58
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.889
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.90      0.42     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.90      SUBAREA RUNOFF(CFS) =    4.58
  EFFECTIVE AREA(ACRES) =    206.90   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.13  AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =      206.9       PEAK FLOW RATE(CFS) =     524.58
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     41.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.58
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.889
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        3.60      0.42     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.60      SUBAREA RUNOFF(CFS) =    8.68
  EFFECTIVE AREA(ACRES) =    210.50   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.13  AREA-AVERAGED Ap =  0.94
  TOTAL AREA(ACRES) =      210.5       PEAK FLOW RATE(CFS) =     524.58
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE     41.00 TO NODE     55.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   633.30  DOWNSTREAM(FEET) =   633.00
  FLOW LENGTH(FEET) =    15.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  54.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.81
  ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     524.58
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   18.59
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     55.00 =    6710.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     55.00 TO NODE     55.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     46.00 TO NODE     47.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   850.00
  ELEVATION DATA: UPSTREAM(FEET) =   1060.00  DOWNSTREAM(FEET) =    740.00
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.479
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.327
  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
  "BARREN"                   B        5.70      0.11     1.000    97    9.48
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.11
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     21.65
  TOTAL AREA(ACRES) =      5.70   PEAK FLOW RATE(CFS) =     21.65

****************************************************************************
  FLOW PROCESS FROM NODE     47.00 TO NODE     48.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    740.00  DOWNSTREAM(FEET) =    640.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   530.00   CHANNEL SLOPE =  0.1887
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      21.65
  FLOW VELOCITY(FEET/SEC) =   9.68 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.91   Tc(MIN.) =   10.39
  LONGEST FLOWPATH FROM NODE     46.00 TO NODE     48.00 =    1380.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     48.00 TO NODE     48.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.39
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.095
  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
  "BARREN"                   B        7.90      0.11     1.000    97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.11
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    7.90      SUBAREA RUNOFF(CFS) =   28.36
  EFFECTIVE AREA(ACRES) =     13.60   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.11  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       13.6       PEAK FLOW RATE(CFS) =      48.82

****************************************************************************
  FLOW PROCESS FROM NODE     48.00 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) =   640.00  DOWNSTREAM(FEET) =   633.60
  FLOW LENGTH(FEET) =   360.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.02
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      48.82
  PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =   10.89
  LONGEST FLOWPATH FROM NODE     46.00 TO NODE     53.00 =    1740.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     53.00 TO NODE     53.00 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.) =   10.89
  RAINFALL INTENSITY(INCH/HR) =   3.98
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.11
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =      13.60
  TOTAL STREAM AREA(ACRES) =      13.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      48.82

****************************************************************************
  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) =   560.00
  ELEVATION DATA: UPSTREAM(FEET) =   1020.00  DOWNSTREAM(FEET) =    810.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    8.028
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.780
  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
  "BARREN"                   B        1.30      0.11     1.000    97    8.03
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.11
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      5.47
  TOTAL AREA(ACRES) =      1.30   PEAK FLOW RATE(CFS) =      5.47

****************************************************************************
  FLOW PROCESS FROM NODE     51.00 TO NODE     52.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    810.00  DOWNSTREAM(FEET) =    630.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   620.00   CHANNEL SLOPE =  0.2903
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       5.47
  FLOW VELOCITY(FEET/SEC) =   6.81 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.52   Tc(MIN.) =    9.54
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     52.00 =    1180.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     52.00 TO NODE     52.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.54
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.309
  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
  "BARREN"                   B        6.10      0.11     1.000    97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.11
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    6.10      SUBAREA RUNOFF(CFS) =   23.07
  EFFECTIVE AREA(ACRES) =      7.40   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.11  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        7.4       PEAK FLOW RATE(CFS) =      27.99

****************************************************************************
  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) =   630.00  DOWNSTREAM(FEET) =   629.50
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.14
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      27.99
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =    9.87
  LONGEST FLOWPATH FROM NODE     50.00 TO NODE     53.00 =    1300.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     53.00 TO NODE     53.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.87
  RAINFALL INTENSITY(INCH/HR) =   4.22
  AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.11
  AREA-AVERAGED Ap =  1.00
  EFFECTIVE STREAM AREA(ACRES) =       7.40
  TOTAL STREAM AREA(ACRES) =       7.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      27.99

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       48.82   10.89    3.981  0.11( 0.11) 1.00      13.6      46.00
      2       27.99    9.87    4.223  0.11( 0.11) 1.00       7.4      50.00

  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       75.00    9.87    4.223  0.11( 0.11) 1.00      19.7      50.00
      2       75.17   10.89    3.981  0.11( 0.11) 1.00      21.0      46.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      75.17    Tc(MIN.) =    10.89
  EFFECTIVE AREA(ACRES) =      21.00   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.11  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =       21.0
  LONGEST FLOWPATH FROM NODE     46.00 TO NODE     53.00 =    1740.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     53.00 TO NODE     54.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   633.60  DOWNSTREAM(FEET) =   633.30
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  31.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.02
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      75.17
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   10.98
  LONGEST FLOWPATH FROM NODE     46.00 TO NODE     54.00 =    1790.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.98
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.961
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        1.30      0.42     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.30      SUBAREA RUNOFF(CFS) =    4.58
  EFFECTIVE AREA(ACRES) =     22.30   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.11  AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =       22.3       PEAK FLOW RATE(CFS) =      77.44

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       77.54    9.96    4.199  0.11( 0.10) 0.94      21.0      50.00
      2       77.44   10.98    3.961  0.11( 0.10) 0.95      22.3      46.00
```

```
  NEW PEAK FLOW DATA ARE:
  PEAK FLOW RATE(CFS) =      77.54  Tc(MIN.) =    9.96
  AREA-AVERAGED Fm(INCH/HR) =  0.10  AREA-AVERAGED Fp(INCH/HR) =  0.11
  AREA-AVERAGED Ap =  0.94  EFFECTIVE AREA(ACRES) =      21.03

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     54.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.96
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.199
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        3.90      0.42     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.90      SUBAREA RUNOFF(CFS) =   14.00
  EFFECTIVE AREA(ACRES) =     24.93   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.14  AREA-AVERAGED Ap =  0.87
  TOTAL AREA(ACRES) =       26.2       PEAK FLOW RATE(CFS) =      91.53

****************************************************************************
  FLOW PROCESS FROM NODE     54.00 TO NODE     55.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   633.30  DOWNSTREAM(FEET) =   633.00
  FLOW LENGTH(FEET) =   230.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  63.0 INCH PIPE IS  46.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.31
  ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      91.53
  PIPE TRAVEL TIME(MIN.) =   0.72    Tc(MIN.) =   10.68
  LONGEST FLOWPATH FROM NODE     46.00 TO NODE     55.00 =    2020.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     55.00 TO NODE     55.00 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       91.53   10.68    4.027  0.14( 0.12) 0.87      24.9      50.00
      2       90.60   11.71    3.812  0.13( 0.12) 0.88      26.2      46.00
  LONGEST FLOWPATH FROM NODE     46.00 TO NODE     55.00 =    2020.00 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      477.63   13.72    3.466  0.14( 0.13) 0.92     158.9      20.00
      2      479.40   13.86    3.445  0.14( 0.13) 0.92     160.4      30.00
      3      524.58   18.59    2.888  0.13( 0.12) 0.94     210.5      10.00
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     55.00 =    6710.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      525.99   10.68    4.027  0.14( 0.13) 0.91     148.6      50.00
      2      540.39   11.71    3.812  0.14( 0.13) 0.91     161.7      46.00
      3      559.73   13.72    3.466  0.14( 0.13) 0.92     185.1      20.00
      4      561.00   13.86    3.445  0.14( 0.13) 0.92     186.6      30.00
      5      592.52   18.59    2.888  0.13( 0.12) 0.93     236.7      10.00
    TOTAL AREA(ACRES) =       236.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      592.52  Tc(MIN.) =   18.591
  EFFECTIVE AREA(ACRES) =    236.70  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.13  AREA-AVERAGED Ap =  0.93
  TOTAL AREA(ACRES) =      236.7
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     55.00 =    6710.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     55.00 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) =   633.00  DOWNSTREAM(FEET) =   632.00
  FLOW LENGTH(FEET) =   520.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN 114.0 INCH PIPE IS  92.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.65
  ESTIMATED PIPE DIAMETER(INCH) = 114.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     592.52
  PIPE TRAVEL TIME(MIN.) =   0.90    Tc(MIN.) =   19.49
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     64.00 =    7230.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     64.00 TO NODE     64.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   19.49
  RAINFALL INTENSITY(INCH/HR) =   2.81
  AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.13
  AREA-AVERAGED Ap =  0.93
  EFFECTIVE STREAM AREA(ACRES) =     236.70
  TOTAL STREAM AREA(ACRES) =     236.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     592.52

****************************************************************************
  FLOW PROCESS FROM NODE     55.00 TO NODE     56.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   880.00
  ELEVATION DATA: UPSTREAM(FEET) =    890.00  DOWNSTREAM(FEET) =    630.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.089
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.168
  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
  "BARREN"                   B        7.10      0.11     1.000    97   10.09
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.11
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     25.96
  TOTAL AREA(ACRES) =      7.10   PEAK FLOW RATE(CFS) =     25.96

****************************************************************************
  FLOW PROCESS FROM NODE     56.00 TO NODE     57.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   630.00  DOWNSTREAM(FEET) =   629.00
  FLOW LENGTH(FEET) =   430.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.85
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.96
  PIPE TRAVEL TIME(MIN.) =   1.48    Tc(MIN.) =   11.57
  LONGEST FLOWPATH FROM NODE     55.00 TO NODE     57.00 =    1310.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     57.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.57
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.839
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.90      0.42     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.90      SUBAREA RUNOFF(CFS) =    2.94
  EFFECTIVE AREA(ACRES) =      8.00   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.12  AREA-AVERAGED Ap =  0.94
  TOTAL AREA(ACRES) =        8.0       PEAK FLOW RATE(CFS) =      26.80

****************************************************************************
  FLOW PROCESS FROM NODE     57.00 TO NODE     58.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   632.00  DOWNSTREAM(FEET) =   631.50
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.38
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.80
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   11.67
  LONGEST FLOWPATH FROM NODE     55.00 TO NODE     58.00 =    1360.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.67
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.820
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        2.00      0.42     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    2.00      SUBAREA RUNOFF(CFS) =    6.49
  EFFECTIVE AREA(ACRES) =     10.00   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.16  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =       10.0       PEAK FLOW RATE(CFS) =      33.15

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.67
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.820
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.10      0.42     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.34
  EFFECTIVE AREA(ACRES) =     10.10   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.16  AREA-AVERAGED Ap =  0.85
  TOTAL AREA(ACRES) =       10.1       PEAK FLOW RATE(CFS) =      33.49

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     58.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.67
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.820
  SUBAREA LOSS RATE DATA(AMC III):
```

```
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.10      0.42     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.34
  EFFECTIVE AREA(ACRES) =     10.20   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  0.16  AREA-AVERAGED Ap =  0.84
  TOTAL AREA(ACRES) =       10.2       PEAK FLOW RATE(CFS) =      33.83

****************************************************************************
  FLOW PROCESS FROM NODE     58.00 TO NODE     59.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   631.50  DOWNSTREAM(FEET) =   631.00
  FLOW LENGTH(FEET) =   235.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  29.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.95
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      33.83
  PIPE TRAVEL TIME(MIN.) =   0.79    Tc(MIN.) =   12.46
  LONGEST FLOWPATH FROM NODE     55.00 TO NODE     59.00 =    1595.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     59.00 TO NODE     59.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.46
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.672
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.70      0.42     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.70      SUBAREA RUNOFF(CFS) =    2.18
  EFFECTIVE AREA(ACRES) =     10.90   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.17  AREA-AVERAGED Ap =  0.82
  TOTAL AREA(ACRES) =       10.9       PEAK FLOW RATE(CFS) =      34.66

****************************************************************************
  FLOW PROCESS FROM NODE     59.00 TO NODE     60.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   631.00  DOWNSTREAM(FEET) =   630.50
  FLOW LENGTH(FEET) =    65.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.21
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      34.66
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   12.59
  LONGEST FLOWPATH FROM NODE     55.00 TO NODE     60.00 =    1660.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     60.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.59
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.649
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.10      0.42     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.10      SUBAREA RUNOFF(CFS) =    0.32
  EFFECTIVE AREA(ACRES) =     11.00   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.17  AREA-AVERAGED Ap =  0.81
  TOTAL AREA(ACRES) =       11.0       PEAK FLOW RATE(CFS) =      34.75

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     60.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.59
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.649
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.00      0.42     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.00      SUBAREA RUNOFF(CFS) =    3.09
  EFFECTIVE AREA(ACRES) =     12.00   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  0.79
  TOTAL AREA(ACRES) =       12.0       PEAK FLOW RATE(CFS) =      37.85

****************************************************************************
  FLOW PROCESS FROM NODE     60.00 TO NODE     61.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   630.50  DOWNSTREAM(FEET) =   630.00
  FLOW LENGTH(FEET) =   200.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  30.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.38
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      37.85
  PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =   13.21
  LONGEST FLOWPATH FROM NODE     55.00 TO NODE     61.00 =    1860.00 FEET.

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

```
  FLOW PROCESS FROM NODE     61.00 TO NODE     61.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.21
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.545
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.60      0.42     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.60      SUBAREA RUNOFF(CFS) =    4.80
  EFFECTIVE AREA(ACRES) =     13.60   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.75
  TOTAL AREA(ACRES) =       13.6       PEAK FLOW RATE(CFS) =      41.53

****************************************************************************
  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) =   630.00  DOWNSTREAM(FEET) =   629.80
  FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  25.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.58
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      41.53
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   13.26
  LONGEST FLOWPATH FROM NODE     55.00 TO NODE     62.00 =    1885.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     62.00 TO NODE     62.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.26
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.538
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.20      0.42     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.63
  EFFECTIVE AREA(ACRES) =     13.80   AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.20  AREA-AVERAGED Ap =  0.74
  TOTAL AREA(ACRES) =       13.8       PEAK FLOW RATE(CFS) =      42.06

****************************************************************************
  FLOW PROCESS FROM NODE     62.00 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) =   629.80  DOWNSTREAM(FEET) =   629.50
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.70
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      42.06
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   13.45
  LONGEST FLOWPATH FROM NODE     55.00 TO NODE     64.00 =    1960.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     64.00 TO NODE     64.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.45
  RAINFALL INTENSITY(INCH/HR) =   3.51
  AREA-AVERAGED Fm(INCH/HR) =  0.15
  AREA-AVERAGED Fp(INCH/HR) =  0.20
  AREA-AVERAGED Ap =  0.74
  EFFECTIVE STREAM AREA(ACRES) =      13.80
  TOTAL STREAM AREA(ACRES) =      13.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      42.06

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1      525.99   11.59    3.835  0.14( 0.13) 0.91     148.6      50.00
      1      540.39   12.61    3.646  0.14( 0.13) 0.91     161.7      46.00
      1      559.73   14.62    3.336  0.14( 0.13) 0.92     185.1      20.00
      1      561.00   14.76    3.318  0.14( 0.13) 0.92     186.6      30.00
      1      592.52   19.49    2.808  0.13( 0.12) 0.93     236.7      10.00
      2       42.06   13.45    3.508  0.20( 0.15) 0.74      13.8      55.00

  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      565.78   11.59    3.835  0.14( 0.13) 0.90     160.5      50.00
      2      581.45   12.61    3.646  0.14( 0.13) 0.90     174.7      46.00
      3      590.49   13.45    3.508  0.14( 0.13) 0.90     185.2      55.00
      4      599.64   14.62    3.336  0.14( 0.13) 0.90     198.9      20.00
      5      600.67   14.76    3.318  0.14( 0.13) 0.90     200.4      30.00
      6      625.81   19.49    2.808  0.13( 0.12) 0.92     250.5      10.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     625.81    Tc(MIN.) =    19.49
  EFFECTIVE AREA(ACRES) =     250.50   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.13  AREA-AVERAGED Ap =  0.92
  TOTAL AREA(ACRES) =      250.5
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     64.00 =    7230.00 FEET.
```

```
****************************************************************************
  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) =   629.50  DOWNSTREAM(FEET) =   574.00
  FLOW LENGTH(FEET) =   350.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  41.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  51.25
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     625.81
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   19.60
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     65.00 =    7580.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     65.00 TO NODE     66.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    574.00  DOWNSTREAM(FEET) =    573.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   130.00   CHANNEL SLOPE =  0.0077
  CHANNEL BASE(FEET) =   20.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =  10.00
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.772
  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
  "OPEN BRUSH"                B        4.20      0.31     1.000    84
  NATURAL POOR COVER
  "BARREN"                    B        5.60      0.11     1.000    97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.19
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =     637.18
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.01
  AVERAGE FLOW DEPTH(FEET) =   3.39   TRAVEL TIME(MIN.) =   0.31
  Tc(MIN.) =   19.91
  SUBAREA AREA(ACRES) =     9.80       SUBAREA RUNOFF(CFS) =   22.75
  EFFECTIVE AREA(ACRES) =    260.30     AREA-AVERAGED Fm(INCH/HR) =   0.13
  AREA-AVERAGED Fp(INCH/HR) =   0.14  AREA-AVERAGED Ap =   0.93
  TOTAL AREA(ACRES) =      260.3         PEAK FLOW RATE(CFS) =     625.81
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  3.36   FLOW VELOCITY(FEET/SEC.) =   6.97
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     66.00 =    7710.00 FEET.

****************************************************************************
  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) =   270.00
  ELEVATION DATA: UPSTREAM(FEET) =    645.20  DOWNSTREAM(FEET) =    642.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.661
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.821
  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.)
  PUBLIC PARK                 B        1.00      0.42     0.850    76   11.66
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.850
  SUBAREA RUNOFF(CFS) =      3.12
  TOTAL AREA(ACRES) =      1.00   PEAK FLOW RATE(CFS) =      3.12

****************************************************************************
  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) =   642.80  DOWNSTREAM(FEET) =   640.00
  FLOW LENGTH(FEET) =   240.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.27
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.12
  PIPE TRAVEL TIME(MIN.) =   0.76    Tc(MIN.) =   12.42
  LONGEST FLOWPATH FROM NODE     70.00 TO NODE     72.00 =     510.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     72.00 TO NODE     72.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.42
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.679
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"        B        1.10      0.42     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.10      SUBAREA RUNOFF(CFS) =    3.43
  EFFECTIVE AREA(ACRES) =      2.10   AREA-AVERAGED Fm(INCH/HR) =  0.28
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.67
  TOTAL AREA(ACRES) =        2.1       PEAK FLOW RATE(CFS) =       6.42

****************************************************************************
  FLOW PROCESS FROM NODE     72.00 TO NODE     73.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   640.00  DOWNSTREAM(FEET) =   634.40
  FLOW LENGTH(FEET) =    90.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.80
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.42
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   12.55
  LONGEST FLOWPATH FROM NODE     70.00 TO NODE     73.00 =     600.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     73.00 TO NODE     73.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.55
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.657
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.20      0.42     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    3.72
  EFFECTIVE AREA(ACRES) =      3.30   AREA-AVERAGED Fm(INCH/HR) =  0.26
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.61
  TOTAL AREA(ACRES) =        3.3       PEAK FLOW RATE(CFS) =      10.10

****************************************************************************
  FLOW PROCESS FROM NODE     73.00 TO NODE     73.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.55
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.657
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.90      0.42     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.90      SUBAREA RUNOFF(CFS) =    5.89
  EFFECTIVE AREA(ACRES) =      5.20   AREA-AVERAGED Fm(INCH/HR) =  0.24
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.57
  TOTAL AREA(ACRES) =        5.2       PEAK FLOW RATE(CFS) =      15.99

****************************************************************************
  FLOW PROCESS FROM NODE     73.00 TO NODE     74.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   634.40  DOWNSTREAM(FEET) =   628.30
  FLOW LENGTH(FEET) =    60.00   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.) =  18.01
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      15.99
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   12.60
  LONGEST FLOWPATH FROM NODE     70.00 TO NODE     74.00 =     660.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     74.00 TO NODE     74.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.60
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.647
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.50      0.42     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.50      SUBAREA RUNOFF(CFS) =    1.62
  EFFECTIVE AREA(ACRES) =      5.70   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.53
  TOTAL AREA(ACRES) =        5.7       PEAK FLOW RATE(CFS) =      17.57

****************************************************************************
  FLOW PROCESS FROM NODE     74.00 TO NODE     75.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   628.30  DOWNSTREAM(FEET) =   618.50
  FLOW LENGTH(FEET) =   105.00   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.) =  17.84
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.57
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   12.70
  LONGEST FLOWPATH FROM NODE     70.00 TO NODE     75.00 =     765.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     75.00 TO NODE     75.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.70
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.630
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.90      0.42     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
```

```
  SUBAREA AREA(ACRES) =    0.90      SUBAREA RUNOFF(CFS) =    2.77
  EFFECTIVE AREA(ACRES) =      6.60   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =        6.6       PEAK FLOW RATE(CFS) =      20.25

****************************************************************************
  FLOW PROCESS FROM NODE     75.00 TO NODE     75.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.70
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.630
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.40      0.42     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.40      SUBAREA RUNOFF(CFS) =    1.23
  EFFECTIVE AREA(ACRES) =      7.00   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.52
  TOTAL AREA(ACRES) =        7.0       PEAK FLOW RATE(CFS) =      21.48

****************************************************************************
  FLOW PROCESS FROM NODE     75.00 TO NODE     76.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   618.50  DOWNSTREAM(FEET) =   605.00
  FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.77
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.48
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   12.81
  LONGEST FLOWPATH FROM NODE     70.00 TO NODE     76.00 =     890.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     76.00 TO NODE     76.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.81
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.612
  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
  "OPEN BRUSH"               B        0.80      0.31     1.000    84
  COMMERCIAL                 B        0.40      0.42     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.31
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.700
  SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    3.66
  EFFECTIVE AREA(ACRES) =      8.20   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.55
  TOTAL AREA(ACRES) =        8.2       PEAK FLOW RATE(CFS) =      25.03

****************************************************************************
  FLOW PROCESS FROM NODE     76.00 TO NODE     76.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.81
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.612
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.20      0.42     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.64
  EFFECTIVE AREA(ACRES) =      8.40   AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.40  AREA-AVERAGED Ap =  0.54
  TOTAL AREA(ACRES) =        8.4       PEAK FLOW RATE(CFS) =      25.67

****************************************************************************
  FLOW PROCESS FROM NODE     76.00 TO NODE     94.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   605.00  DOWNSTREAM(FEET) =   565.00
  FLOW LENGTH(FEET) =  1100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.48
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.67
  PIPE TRAVEL TIME(MIN.) =   1.36    Tc(MIN.) =   14.17
  LONGEST FLOWPATH FROM NODE     70.00 TO NODE     94.00 =    1990.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     94.00 TO NODE     94.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   14.17
  RAINFALL INTENSITY(INCH/HR) =   3.40
  AREA-AVERAGED Fm(INCH/HR) =  0.22
  AREA-AVERAGED Fp(INCH/HR) =  0.40
  AREA-AVERAGED Ap =  0.54
  EFFECTIVE STREAM AREA(ACRES) =       8.40
  TOTAL STREAM AREA(ACRES) =       8.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      25.67

****************************************************************************
  FLOW PROCESS FROM NODE     80.00 TO NODE     81.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   450.00
  ELEVATION DATA: UPSTREAM(FEET) =    629.10  DOWNSTREAM(FEET) =    624.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   11.155
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.924
  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
  "5-7 DWELLINGS/ACRE"       B        1.20      0.42     0.500    76   11.15
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA RUNOFF(CFS) =      4.01
  TOTAL AREA(ACRES) =      1.20   PEAK FLOW RATE(CFS) =      4.01

****************************************************************************
  FLOW PROCESS FROM NODE     81.00 TO NODE     82.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   624.40  DOWNSTREAM(FEET) =   624.00
  FLOW LENGTH(FEET) =    25.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.33
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.01
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   11.22
  LONGEST FLOWPATH FROM NODE     80.00 TO NODE     82.00 =     475.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     82.00 TO NODE     82.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.22
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.910
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        1.20      0.42     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    1.20      SUBAREA RUNOFF(CFS) =    3.99
  EFFECTIVE AREA(ACRES) =      2.40   AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        2.4       PEAK FLOW RATE(CFS) =       7.99

****************************************************************************
  FLOW PROCESS FROM NODE     82.00 TO NODE     88.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   624.00  DOWNSTREAM(FEET) =   623.40
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.70
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.99
  PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =   11.44
  LONGEST FLOWPATH FROM NODE     80.00 TO NODE     88.00 =     550.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     88.00 TO NODE     88.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.44
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.865
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.70      0.42     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.70      SUBAREA RUNOFF(CFS) =    2.30
  EFFECTIVE AREA(ACRES) =      3.10   AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.50
  TOTAL AREA(ACRES) =        3.1       PEAK FLOW RATE(CFS) =      10.19

****************************************************************************
  FLOW PROCESS FROM NODE     88.00 TO NODE     88.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.44
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.865
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 B        0.20      0.42     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.69
  EFFECTIVE AREA(ACRES) =      3.30   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        3.3       PEAK FLOW RATE(CFS) =      10.88

****************************************************************************
  FLOW PROCESS FROM NODE     88.00 TO NODE     89.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   623.40  DOWNSTREAM(FEET) =   620.90
```

```
  FLOW LENGTH(FEET) =   260.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.70
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.88
  PIPE TRAVEL TIME(MIN.) =   0.65    Tc(MIN.) =   12.09
  LONGEST FLOWPATH FROM NODE     80.00 TO NODE     89.00 =     810.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     89.00 TO NODE     89.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.09
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.740
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.90      0.42     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.90      SUBAREA RUNOFF(CFS) =    2.86
  EFFECTIVE AREA(ACRES) =      4.20   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        4.2       PEAK FLOW RATE(CFS) =      13.37

****************************************************************************
  FLOW PROCESS FROM NODE     89.00 TO NODE     90.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   620.90  DOWNSTREAM(FEET) =   620.20
  FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.06
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.37
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   12.25
  LONGEST FLOWPATH FROM NODE     80.00 TO NODE     90.00 =     880.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     90.00 TO NODE     90.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.25
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.710
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.60      0.42     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.60      SUBAREA RUNOFF(CFS) =    1.89
  EFFECTIVE AREA(ACRES) =      4.80   AREA-AVERAGED Fm(INCH/HR) =  0.20
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.48
  TOTAL AREA(ACRES) =        4.8       PEAK FLOW RATE(CFS) =      15.14

****************************************************************************
  FLOW PROCESS FROM NODE     90.00 TO NODE     90.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.25
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.710
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.80      0.42     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    2.52
  EFFECTIVE AREA(ACRES) =      5.60   AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =        5.6       PEAK FLOW RATE(CFS) =      17.66

****************************************************************************
  FLOW PROCESS FROM NODE     90.00 TO NODE     91.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   620.20  DOWNSTREAM(FEET) =   618.00
  FLOW LENGTH(FEET) =   220.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.63
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.66
  PIPE TRAVEL TIME(MIN.) =   0.48    Tc(MIN.) =   12.73
  LONGEST FLOWPATH FROM NODE     80.00 TO NODE     91.00 =    1100.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     91.00 TO NODE     91.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.73
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.625
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        0.80      0.42     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    2.46
  EFFECTIVE AREA(ACRES) =      6.40   AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.49
```

```
  TOTAL AREA(ACRES) =        6.4       PEAK FLOW RATE(CFS) =      19.69

****************************************************************************
  FLOW PROCESS FROM NODE     91.00 TO NODE     92.00 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) =   617.50
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.37
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.69
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   12.87
  LONGEST FLOWPATH FROM NODE     80.00 TO NODE     92.00 =    1160.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     92.00 TO NODE     92.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.87
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.602
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  RESIDENTIAL
  "5-7 DWELLINGS/ACRE"       B        3.20      0.42     0.500    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.500
  SUBAREA AREA(ACRES) =    3.20      SUBAREA RUNOFF(CFS) =    9.76
  EFFECTIVE AREA(ACRES) =      9.60   AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  0.49
  TOTAL AREA(ACRES) =        9.6       PEAK FLOW RATE(CFS) =      29.32

****************************************************************************
  FLOW PROCESS FROM NODE     92.00 TO NODE     94.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   617.50  DOWNSTREAM(FEET) =   565.00
  FLOW LENGTH(FEET) =   400.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.76
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      29.32
  PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =   13.16
  LONGEST FLOWPATH FROM NODE     80.00 TO NODE     94.00 =    1560.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     94.00 TO NODE     94.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.16
  RAINFALL INTENSITY(INCH/HR) =   3.55
  AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.42
  AREA-AVERAGED Ap =  0.49
  EFFECTIVE STREAM AREA(ACRES) =       9.60
  TOTAL STREAM AREA(ACRES) =       9.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      29.32

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       25.67   14.17    3.400  0.40( 0.22) 0.54       8.4      70.00
      2       29.32   13.16    3.554  0.42( 0.21) 0.49       9.6      80.00

  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       54.33   13.16    3.554  0.41( 0.21) 0.51      17.4      80.00
      2       53.65   14.17    3.400  0.41( 0.21) 0.51      18.0      70.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      54.33    Tc(MIN.) =    13.16
  EFFECTIVE AREA(ACRES) =      17.40   AREA-AVERAGED Fm(INCH/HR) =  0.21
  AREA-AVERAGED Fp(INCH/HR) =  0.41  AREA-AVERAGED Ap =  0.51
  TOTAL AREA(ACRES) =       18.0
  LONGEST FLOWPATH FROM NODE     70.00 TO NODE     94.00 =    1990.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     94.00 TO NODE     95.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   565.00  DOWNSTREAM(FEET) =   561.00
  FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.86
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      54.33
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   13.19
  LONGEST FLOWPATH FROM NODE     70.00 TO NODE     95.00 =    2035.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     95.00 TO NODE     95.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   13.19
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.548
```

```
  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
  "OPEN BRUSH"                B        3.50      0.31     1.000    84
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.31
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.50      SUBAREA RUNOFF(CFS) =   10.21
  EFFECTIVE AREA(ACRES) =     20.90   AREA-AVERAGED Fm(INCH/HR) =  0.23
  AREA-AVERAGED Fp(INCH/HR) =  0.38  AREA-AVERAGED Ap =  0.59
  TOTAL AREA(ACRES) =       21.5       PEAK FLOW RATE(CFS) =      62.47

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   865.00
  ELEVATION DATA: UPSTREAM(FEET) =    830.00  DOWNSTREAM(FEET) =    640.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   10.632
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.039
  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
  "BARREN"                    B        3.40      0.11     1.000    97   10.63
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.11
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =     12.03
  TOTAL AREA(ACRES) =      3.40   PEAK FLOW RATE(CFS) =     12.03

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    640.00  DOWNSTREAM(FEET) =    630.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   230.00   CHANNEL SLOPE =  0.0435
  CHANNEL FLOW THRU SUBAREA(CFS) =      12.03
  FLOW VELOCITY(FEET/SEC) =   5.46 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.70   Tc(MIN.) =   11.33
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =    1095.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.33
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.887
  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
  "BARREN"                    B        2.60      0.11     1.000    97
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.11
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    2.60      SUBAREA RUNOFF(CFS) =    8.85
  EFFECTIVE AREA(ACRES) =      6.00   AREA-AVERAGED Fm(INCH/HR) =  0.11
  AREA-AVERAGED Fp(INCH/HR) =  0.11  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        6.0       PEAK FLOW RATE(CFS) =      20.42

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   630.00  DOWNSTREAM(FEET) =   628.00
  FLOW LENGTH(FEET) =   155.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.69
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      20.42
  PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   11.63
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =    1250.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.63
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.827
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.20      0.42     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.68
  EFFECTIVE AREA(ACRES) =      6.20   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.11  AREA-AVERAGED Ap =  0.97
  TOTAL AREA(ACRES) =        6.2       PEAK FLOW RATE(CFS) =      20.77

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.63
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.827
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  B        0.20      0.42     0.100    76
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
```

```
  SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    0.68
  EFFECTIVE AREA(ACRES) =      6.40   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.11  AREA-AVERAGED Ap =  0.94
  TOTAL AREA(ACRES) =        6.4       PEAK FLOW RATE(CFS) =      21.46

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   628.00  DOWNSTREAM(FEET) =   627.50
  FLOW LENGTH(FEET) =   190.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.85
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.46
  PIPE TRAVEL TIME(MIN.) =   0.65    Tc(MIN.) =   12.28
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =    1440.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.28
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.704
  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
  "OPEN BRUSH"                B        0.60      0.31     1.000    84
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.31
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    0.60      SUBAREA RUNOFF(CFS) =    1.83
  EFFECTIVE AREA(ACRES) =      7.00   AREA-AVERAGED Fm(INCH/HR) =  0.12
  AREA-AVERAGED Fp(INCH/HR) =  0.13  AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =        7.0       PEAK FLOW RATE(CFS) =      22.58

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   627.50  DOWNSTREAM(FEET) =   615.00
  FLOW LENGTH(FEET) =   320.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  11.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.69
  GIVEN PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      22.58
  PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =   12.67
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =    1760.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.67
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.635
  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
  "OPEN BRUSH"                B        0.80      0.31     1.000    84
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.31
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    0.80      SUBAREA RUNOFF(CFS) =    2.40
  EFFECTIVE AREA(ACRES) =      7.80   AREA-AVERAGED Fm(INCH/HR) =  0.14
  AREA-AVERAGED Fp(INCH/HR) =  0.15  AREA-AVERAGED Ap =  0.95
  TOTAL AREA(ACRES) =        7.8       PEAK FLOW RATE(CFS) =      24.54

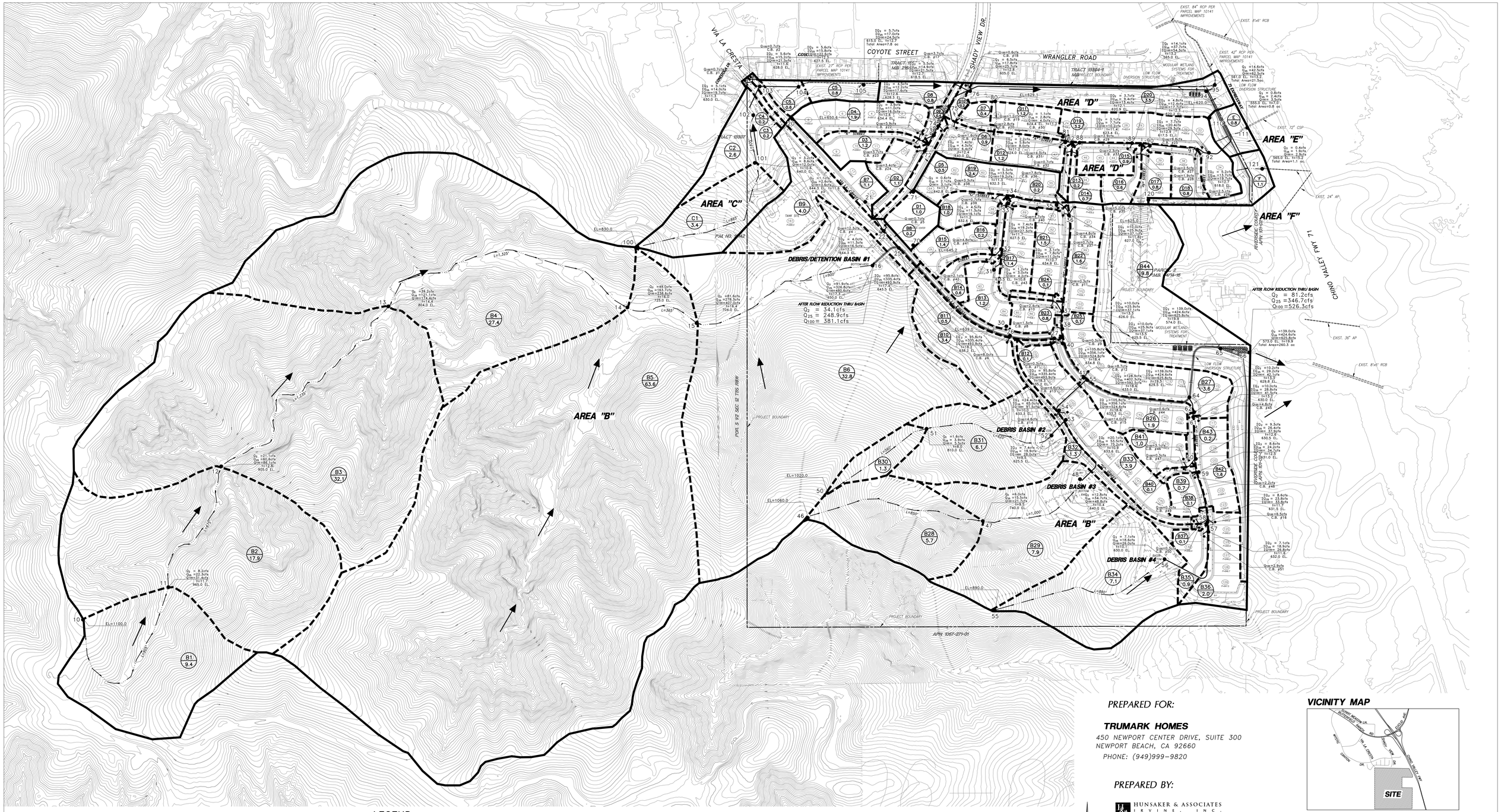
****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    111.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   185.00
  ELEVATION DATA: UPSTREAM(FEET) =    620.00  DOWNSTREAM(FEET) =    555.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    7.023
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.180
  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
  "OPEN BRUSH"                B        0.80      0.31     1.000    84    7.02
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.31
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      3.51
  TOTAL AREA(ACRES) =      0.80   PEAK FLOW RATE(CFS) =      3.51

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    121.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   650.00
  ELEVATION DATA: UPSTREAM(FEET) =    625.00  DOWNSTREAM(FEET) =    565.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =   15.168
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.263
  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
  "OPEN BRUSH"                B        1.10      0.31     1.000    84   15.17
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.31
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      2.93
  TOTAL AREA(ACRES) =      1.10   PEAK FLOW RATE(CFS) =      2.93
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.1  TC(MIN.) =     15.17
  EFFECTIVE AREA(ACRES) =      1.10  AREA-AVERAGED Fm(INCH/HR)=  0.31
  AREA-AVERAGED Fp(INCH/HR) =  0.31  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =       2.93
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```



PREPARED FOR:

TRUMARK HOMES

450 NEWPORT CENTER DRIVE, SUITE 300
NEWPORT BEACH, CA 92660
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PREPARED BY:

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PLANNING • ENGINEERING • SURVEYING
Three Hughes • Irvine, CA 92618 • PH: (949) 583-1010 • FX: (949) 583-0759

GRAPHIC SCALE: 1"=120'

LEGEND

- MAJOR DRAINAGE BOUNDARY
- MINOR DRAINAGE BOUNDARY
- NODE NUMBER
- AREA DESIGNATION / AREA ACREAGE (IN ACRES)
- PEAK FLOW RATE / TIME OF CONCENTRATION
- PROPOSED STORM DRAIN
- PEAK CONFLUENCE FLOW RATE / TIME OF CONCENTRATION
- EXISTING STORM DRAIN
- SOIL GROUP

VICINITY MAP

PROPOSED CONDITION HYDROLOGY MAP
VTTM 20317
CITY OF CHINO HILLS
SAN BERNARDINO COUNTY

PLOTTED BY: Gary Guan DATE: Mar. 27, 2020 TIME: 08:20 AM F:\1062\Engineering\SY_Hydrology\Proposed Hydrology – Tract 20317.dwg

JOB: 2062-SAK
HYDROLOGY MAP FOR SHADY VIEW PROJECT

SECTION 4
DEBRIS YIELD AND DEBRIS BASIN CALCULATIONS

Sediment Yield

Sediment Yield Characteristics

Sediment yield characteristics for watersheds in this type of physiographic and geologic environment are closely related to the extremely steep overland slopes and relatively loose surface material. Supply of sediment to the stream channels occurs through a number of mechanisms including sliding and rolling of material from the slopes during dry periods and erosion of material due to overland flow during storms. In general, sediment builds up in the channels through this process on a relatively continuous basis. During intense storms, significant amounts of material are washed from the watershed slopes into the channels. High antecedent moisture conditions contribute to the instability of the slopes increasing the overland erosion rate and in some case including landslides. If the runoff is off sufficient intensity, debris flows consisting of slurry or coarse granular material occur resulting in mass movement of large quantities of material within the system. Due to the ephemeral nature of the streams and relatively large bed material sizes, sediment yield during small storm events is relatively insignificant.

Field reconnaissance performed for this study indicates susceptibility of forest fires in the area and availability of a tremendous supply of erodible material from sand through large boulders in the upstream watersheds.

Methodology

The U.S. Army Corps of Engineers, Los Angeles District Debris Method was selected to determine the sediment yield for the study watershed. The Los Angeles District Method for prediction of Debris Yield was developed to provide a systematic approach for determining the debris yield from a single flood event. The method was developed using data form coastal-draining, mountainous, Southern California watersheds, varying in area from 0.1 to 200 square miles with a high proportion of their area in steep, mountainous terrain. It is intended to estimate debris yield for flood events greater than those with a 5-year recurrence.

Since the watershed of upstream is between 0.1 to 3.0 square miles, the use of the following equation is appropriate.

Log Dy=0.65(Log P) + 0.18(Log A) + 0.62(Log RR) + 0.12(FF)

Where:

Dy = Unit Debris Yield (yd^3/mi^2)

P = Maximum 1-Hour Precipitation (inches, taken to two places after the decimal point, times 100)

RR = Relief Ratio (ft/mi)

A = Drainage Area (ac)

FF = Non-dimensional Fire Factor

The maximum 1-hour precipitation (P) for a specific flood event is determined by the San Bernardino County Hydrology Manual based upon the project location and storm frequency. The Relief Ratio (RR) is defined as the ratio of the elevation difference (ft) between the highest and lowest points in the watershed to the longest watercourse (mi). The Fire Factor (FF) is a non-dimensional factor for the subject watershed, which is determined to be 6.5 to be conservative, Page 17, Debris Method, published by U.S. Army Corps of Engineers, Los Angeles District (Updated February, 2000).

Sediment Yield for Debris Basin #1

Step 1. Determine the maximum 1-hour precipitation (P) applicable to the flood event and multiply by 100.

From San Bernardino County Hydrology Manual, the maximum 1-hour precipitation for this site is approximately 1.90 (between 1.08 to 1.90) inches. The maximum 1-hour precipitation multiplied by 100 is 190

Step 2. Draw the drainage boundary and determine the area of the watershed (A) in mi^2 and acre.

From the drainage area exhibit, the area of the watershed was determined to be approximately 183.2 acres, or 0.2863 mi^2.

Step 3. Determine the relief ratio (RR) of the watershed.

Locate the highest point in the watershed at the end of the longest watercourse (1,100ft), and the lowest point (650 ft) at the watershed downstream; determine the difference between these two in feet. Next, determine the length of the longest watercourse (5,405ft), in miles (1.024 mi). Express the difference between the high and low elevations (in ft) and the length of the longest watercourse (in mi) as a ratio. For the upstream off-site watershed:

1,100 – 650 = 450 ft, divided by 1.024 mi = 440 ft/mi.

Step 4. Determine the Fire Factor (FF) for the subject watershed.

FF is determined to be 6.5 to be conservative.

Step 5. Determine the Adjustment-Transposition Factor (A-T).

The A-T Factor is assumed to be 1.00.

Step 6. Calculate the Log (Base 10) of the factors P, RR, and A. FF and A-T are dimensionless and are used as is.

From STEP 1, Log (P) = Log (190) = 2.2788

From STEP 2, Log (A) = Log (183.2) = 2.2629

From STEP 3, Log (RR) = Log (440) = 2.6435

From STEP 4, FF = 6.50

From STEP 5, A-T = 1.00

Step 7. Apply Equation 1 for this watershed. Solve for unit debris yield using the above values:

Log Dy = 0.65 (Log P) + 0.18 (Log A) + 0.62 (Log RR) + 0.12 (FF)

Log Dy = 0.65 (2.2788) + 0.18 (2.2629) + 0.62 (2.6435) + 0.12 (6.50)

Log Dy = 1.4812 + 0.4073 + 1.6390 + 0.780

Log Dy = 4.3075

Step 8. Calculate the antilog of Dy.

AntiLog Dy = 20,300 yd^3/mi^2

Step 9. Multiply the resulting Dy by the A-T Factor to get the adjusted unit debris yield for the project.

Adjusted Dy = 1.0 (20,300) = 20,300 yd^3/mi^2

Step 10. Multiply the adjusted unit debris yield by the drainage area to determine the volume of debris.
20,300 yd^3/mi^2 x 0.2863 mi^2 = total debris yield of 5,812 yd^3=156,924 ft^3=**3.60** ac-ft

Sediment Yield for Debris Basin #2

Step 1. Determine the maximum 1-hour precipitation (P) applicable to the flood event and multiply by 100.

From San Bernardino County Hydrology Manual, the maximum 1-hour precipitation for this site is approximately 1.90 (between 1.08 to 1.90) inches. The maximum 1-hour precipitation multiplied by 100 is 190

Step 2. Draw the drainage boundary and determine the area of the watershed (A) in mi^2 and acre.

From the drainage area exhibit, the area of the watershed was determined to be approximately 7.4 acres, or 0.0116 mi^2.

Step 3. Determine the relief ratio (RR) of the watershed.

Locate the highest point in the watershed at the end of the longest watercourse (1,020ft), and the lowest point (630 ft) at the watershed downstream; determine the difference between these two in feet. Next, determine the length of the longest watercourse (1,180 ft), in miles (0.2045 mi). Express the difference between the high and low elevations (in ft) and the length of the longest watercourse (in mi) as a ratio. For the upstream off-site watershed:

1,020 – 630 = 390 ft, divided by 0.2045 mi = 1,907 ft/mi.

Step 4. Determine the Fire Factor (FF) for the subject watershed.

FF is determined to be 6.5 to be conservative.

Step 5. Determine the Adjustment-Transposition Factor (A-T).

The A-T Factor is assumed to be 1.00.

Step 6. Calculate the Log (Base 10) of the factors P, RR, and A. FF and A-T are dimensionless and are used as is.

From STEP 1, Log (P) = Log (190) = 2.2788

From STEP 2, Log (A) = Log (7.4) = 0.8692

From STEP 3, Log (RR) = Log (1907) = 2.9576

From STEP 4, FF = 6.50

From STEP 5, A-T = 1.00

Step 7. Apply Equation 1 for this watershed. Solve for unit debris yield using the above values:

Log Dy = 0.65 (Log P) + 0.18 (Log A) + 0.62 (Log RR) + 0.12 (FF)

Log Dy = 0.65 (2.2788) + 0.18 (0.8692) + 0.62 (2.9576) + 0.12 (6.50)

Log Dy = 1.4812 + 0.1565 + 1.8337 + 0.780

Log Dy = 4.2514

Step 8. Calculate the antilog of Dy.

AntiLog Dy = 17,840 yd^3/mi^2

Step 9. Multiply the resulting Dy by the A-T Factor to get the adjusted unit debris yield for the project.

Adjusted Dy = 1.0 (17,840) = 17,840 yd^3/mi^2

Step 10. Multiply the adjusted unit debris yield by the drainage area to determine the volume of debris.
17,840 yd^3/mi^2 x 0.0116 mi^2 = total debris yield of 207 yd^3=5,590 ft^3=**0.13** ac-ft

Sediment Yield for Debris Basin #3

Step 1. Determine the maximum 1-hour precipitation (P) applicable to the flood event and multiply by 100.

From San Bernardino County Hydrology Manual, the maximum 1-hour precipitation for this site is approximately 1.90 (between 1.08 to 1.90) inches. The maximum 1-hour precipitation multiplied by 100 is 190

Step 2. Draw the drainage boundary and determine the area of the watershed (A) in mi^2 and acre.

From the drainage area exhibit, the area of the watershed was determined to be approximately 13.6 acres, or 0.0213mi^2.

Step 3. Determine the relief ratio (RR) of the watershed.

Locate the highest point in the watershed at the end of the longest watercourse (1,060ft), and the lowest point (640 ft) at the watershed downstream; determine the difference between these two in feet. Next, determine the length of the longest watercourse (1,850 ft), in miles (0.3504 mi). Express the difference between the high and low elevations (in ft) and the length of the longest watercourse (in mi) as a ratio. For the upstream off-site watershed:

1,060 – 640 = 420 ft, divided by 0.3504 mi = 1,199 ft/mi.

Step 4. Determine the Fire Factor (FF) for the subject watershed.

FF is determined to be 6.5 to be conservative.

Step 5. Determine the Adjustment-Transposition Factor (A-T).

The A-T Factor is assumed to be 1.00.

Step 6. Calculate the Log (Base 10) of the factors P, RR, and A. FF and A-T are dimensionless and are used as is.

From STEP 1, Log (P) = Log (190) = 2.2788

From STEP 2, Log (A) = Log (13.6) = 1.1335

From STEP 3, Log (RR) = Log (1199) = 3.0787

From STEP 4, FF = 6.50

From STEP 5, A-T = 1.00

Step 7. Apply Equation 1 for this watershed. Solve for unit debris yield using the above values:

Log Dy = 0.65 (Log P) + 0.18 (Log A) + 0.62 (Log RR) + 0.12 (FF)

Log Dy = 0.65 (2.2788) + 0.18 (1.1335) + 0.62 (3.0787) + 0.12 (6.50)

Log Dy = 1.4812 + 0.2040 + 1.9088 + 0.780

Log Dy = 4.3740

Step 8. Calculate the antilog of Dy.

AntiLog Dy = 23,660 yd^3/mi^2

Step 9. Multiply the resulting Dy by the A-T Factor to get the adjusted unit debris yield for the project.

Adjusted Dy = 1.0 (23,660) = 23,660 yd^3/mi^2

Step 10. Multiply the adjusted unit debris yield by the drainage area to determine the volume of debris.
23,660 yd^3/mi^2 x 0.0213 mi^2 = total debris yield of 504 yd^3=13,608 ft^3=**0.31** ac-ft

Sediment Yield for Debris Basin #4

Step 1. Determine the maximum 1-hour precipitation (P) applicable to the flood event and multiply by 100.

From San Bernardino County Hydrology Manual, the maximum 1-hour precipitation for this site is approximately 1.90 (between 1.08 to 1.90) inches. The maximum 1-hour precipitation multiplied by 100 is 190

Step 2. Draw the drainage boundary and determine the area of the watershed (A) in mi^2 and acre.

From the drainage area exhibit, the area of the watershed was determined to be approximately 7.1 acres, or 0.0111mi^2.

Step 3. Determine the relief ratio (RR) of the watershed.

Locate the highest point in the watershed at the end of the longest watercourse (890ft), and the lowest point (630 ft) at the watershed downstream; determine the difference between these two in feet. Next, determine the length of the longest watercourse (880 ft), in miles (0.16667mi). Express the difference between the high and low elevations (in ft) and the length of the longest watercourse (in mi) as a ratio. For the upstream off-site watershed:

890 – 630 = 260 ft, divided by 0.16667 mi = 1,560 ft/mi.

Step 4. Determine the Fire Factor (FF) for the subject watershed.

FF is determined to be 6.5 to be conservative.

Step 5. Determine the Adjustment-Transposition Factor (A-T).

The A-T Factor is assumed to be 1.00.

Step 6. Calculate the Log (Base 10) of the factors P, RR, and A. FF and A-T are dimensionless and are used as is.

From STEP 1, Log (P) = Log (190) = 2.2788

From STEP 2, Log (A) = Log (7.1) = 0.8513

From STEP 3, Log (RR) = Log (1560) = 3.1931

From STEP 4, FF = 6.50

From STEP 5, A-T = 1.00

Step 7. Apply Equation 1 for this watershed. Solve for unit debris yield using the above values:

Log Dy = 0.65 (Log P) + 0.18 (Log A) + 0.62 (Log RR) + 0.12 (FF)

Log Dy = 0.65 (2.2788) + 0.18 (0.8513) + 0.62 (3.1931) + 0.12 (6.50)

Log Dy = 1.4812 + 0.1532 + 1.9797 + 0.780

Log Dy = 4.3941

Step 8. Calculate the antilog of Dy.

AntiLog Dy = 24,780 yd^3/mi^2

Step 9. Multiply the resulting Dy by the A-T Factor to get the adjusted unit debris yield for the project.

Adjusted Dy = 1.0 (24,780) = 24,780 yd^3/mi^2

Step 10. Multiply the adjusted unit debris yield by the drainage area to determine the volume of debris.
24,780 yd^3/mi^2 x 0.0111 mi^2 = total debris yield of 275 yd^3=7,425 ft^3=**0.17** ac-ft

Table 5 Debris Basin Summary for Tract 17931
Tract 20317 - Shady View
Chino Hills, County of San Bernardino

Debris Basin	Volume Required	Volume Provided
	(ac-ft)	(ac-ft)
#1	3.60	4.09*
#2	0.13	1.78
#3	0.31	3.25
#4	0.17	3.79

Note:
* The basin is designed to provide the debris and detention functions. The volumes above the debris volume is designated for detention volumes

Provided Debris Basin #1
Designer: Gary Guan
Project: TTM 20317 - Shady View
Location: Chino Hills, San Bernardino County
Date: 10/30/2019

Elevation	$Depth_{incremental}$	$Depth_{cumulative}$	Area	$Area_{average}$	$Volume_{incremental}$		$Volume_{cumulative}$		Available Volume for Detention	
(ft)	(ft)	(ft)	(ft^2)	(ft^2)	(ft^3)	(ac-ft)	(ft^3)	(ac-ft)		
650.00			22400				0	0	Debris Volume	
	5.00			28450	142250	3.266				
655.00		5.00	34500				142250	3.27		
	1.00			35850	35850	0.823				
656.00		6.00	37200				178100	4.09		
	1.00			38550	38550	0.885			(ac-ft)	(ft^3)
657.00		7.00	39900				216650	4.97	0.88	38550
	1.00			41350	41350	0.949				
658.00		8.00	42800				258000	5.92	1.83	79900
	1.00			44250	44250	1.016				
659.00		9.00	45700				302250	6.94	2.85	124150
	1.00			48950	48950	1.124				
660.00		10.00	52200				351200	8.06	3.97	173100
	1.00			54500	54500	1.251				
661.00		11.00	56800				405700	9.31	5.22	227600
	1.00			58550	58550	1.344				
662.00		12.00	60300				464250	10.66	6.57	286150
	1.00			62000	62000	1.423				
663.00		13.00	63700				526250	12.08	7.99	348150

Note:

The calculated debris volume is about 3.60 ac-ft. The volume below 656.0 (about 4.09 ac-ft) is designated for the debris volume and the volumes above elevation 656.0 are provided for detention functions.

SECTION 5
UNIT HYDROGRAPH AND BASIN ROUTING CALCULATIONS

Provided Debris Basin #1
Designer: Gary Guan
Project: TTM 20317 - Shady View
Location: Chino Hills, San Bernardino County
Date: 10/30/2019

Elevation	$Depth_{incremental}$	$Depth_{cumulative}$	Area	$Area_{average}$	$Volume_{incremental}$		$Volume_{cumulative}$		Available Volume for Detention	
(ft)	(ft)	(ft)	(ft^2)	(ft^2)	(ft^3)	(ac-ft)	(ft^3)	(ac-ft)		
650.00			22400				0	0	Debris Volume	
	5.00			28450	142250	3.266				
655.00		5.00	34500				142250	3.27		
	1.00			35850	35850	0.823				
656.00		6.00	37200				178100	4.09		
	1.00			38550	38550	0.885			(ac-ft)	(ft^3)
657.00		7.00	39900				216650	4.97	0.88	38550
	1.00			41350	41350	0.949				
658.00		8.00	42800				258000	5.92	1.83	79900
	1.00			44250	44250	1.016				
659.00		9.00	45700				302250	6.94	2.85	124150
	1.00			48950	48950	1.124				
660.00		10.00	52200				351200	8.06	3.97	173100
	1.00			54500	54500	1.251				
661.00		11.00	56800				405700	9.31	5.22	227600
	1.00			58550	58550	1.344				
662.00		12.00	60300				464250	10.66	6.57	286150
	1.00			62000	62000	1.423				
663.00		13.00	63700				526250	12.08	7.99	348150

Note:

The calculated debris volume is about 3.60 ac-ft. The volume below 656.0 (about 4.09 ac-ft) is designated for the debris volume and the volumes above elevation 656.0 are provided for detention functions.

Provided Debris Basin #2
Designer: Gary Guan
Project: TTM 20317 - Shady View
Location: Chino Hills, San Bernardino County
Date: 3/26/2020

Elevation	$Depth_{incremental}$	$Depth_{cumulative}$	Area	$Area_{average}$	$Volume_{incremental}$		$Volume_{cumulative}$	
(ft)	(ft)	(ft)	(ft^2)	(ft^2)	(ft^3)	(ac-ft)	(ft^3)	(ac-ft)
630.00			2000				0	0
	10.00			7750	77500	1.779		
640.00		10.00	13500				77500	1.78

Secondary spillway is based on:
$Q=CLH^{1.5}$
where:
C = Coefficient, 3.367 used here based on Cipolletti Sharp-Crested Weir
L = Weir Length (10-ft)
H = Headwater (0.88')
Q=100-year discharge, 28.0 cfs

The top of berm is at elev. 640.0 with weir elev. 638.0 The calculated water surface is about 638.88 with 1.12-ft freeboard

Provided Debris Basin #3
Designer: Gary Guan
Project: TTM 20317 - Shady View
Location: Chino Hills, San Bernardino County
Date: 3/27/2020

Elevation	$Depth_{incremental}$	$Depth_{cumulative}$	Area	$Area_{average}$	$Volume_{incremental}$		$Volume_{cumulative}$	
(ft)	(ft)	(ft)	(ft^2)	(ft^2)	(ft^3)	(ac-ft)	(ft^3)	(ac-ft)
640.00			6300				0	0
	10.00			14150	141500	3.248		
650.00		10.00	22000				141500	3.25

Secondary spillway is based on:
$Q=CLH^{1.5}$
where:
C = Coefficient, 3.367 used here based on Cipolletti Sharp-Crested Weir
L = Weir Length (15-ft)
H = Headwater (0.98')
Q=100-year discharge, 48.8 cfs

The top of berm is at elev. 650.0 with weir elev. 648.0 The calculated water surface is about 649.0 with 1.0-ft freeboard

Provided Debris Basin #4
Designer: Gary Guan
Project: TTM 20317 - Shady View
Location: Chino Hills, San Bernardino County
Date: 3/27/2020

Elevation	$Depth_{incremental}$	$Depth_{cumulative}$	Area	$Area_{average}$	$Volume_{incremental}$		$Volume_{cumulative}$	
(ft)	(ft)	(ft)	(ft^2)	(ft^2)	(ft^3)	(ac-ft)	(ft^3)	(ac-ft)
630.00			9000				0	0
	10.00			16500	165000	3.788		
640.00		10.00	24000				165000	3.79

DEBRIS/DETENTION BASIN #1
OUTFLOW VS DEPTH CALCULATIONS

				HOLES	HOLES	HOLES	HOLES	HOLES	HOLES	HOLES	TOP OF RISER		
			No. of Holes →	4	4	4	4	6	10	10	1	←	No. of Weir
				HOLE C	HOLE C	HOLE C	HOLE C	HOLE C	HOLE C	HOLE C	TOP OF RISER C		
			Discharge Coefficient →	0.6	0.6	0.6	0.6	0.6	0.6	0.6	2.8	←	Weir Coefficient
				HOLE FL	HOLE FL	HOLE FL	HOLE FL	HOLE FL	HOLE FL	HOLE FL	DIST TO TOP OF RISER		
			Distance of Holes from Basin Bottom (in) →	0	12	18	24	30	36	42	48	←	Distance of Top of Riser Pipe from Basin Bottom (in)
				HOLE R	HOLE R	HOLE R	HOLE R	HOLE R	HOLE R	HOLE R	RISER LENGTH (FT)		
			Hole Radius (in) →	4.00	4.00	2.00	2.00	6	6	6	31.416	←	Riser Pipe Perimeter (ft) =PAI*D, 120" Riser Pipe
				CEN EL	CEN EL	CEN EL	CEN EL	CEN EL	CEN EL	CEN EL	TOP OF RISER ELEV		
			Hole Centerline Elev →	656.3333	657.3333	657.6667	658.1667	659	659.5	660	660.0	←	Top of Weir Elevation (ft)
ELEV	DEPTH	OUTFLOW									AREA		
656.00	0	0									0	←	(sq-ft)
657.00	1	5.49		5.49	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
658.00	2	15.14		8.68	5.49	0.97	0.00	0.00	0.00	0.00	0.00		
659.00	3	23.13		10.98	8.68	1.94	1.53	0.00	0.00	0.00	0.00		
660.00	4	78.13		12.87	10.98	2.57	2.28	22.69	26.74	0.00	0.00		
661.00	5	237.48		14.52	12.87	3.07	2.83	32.09	46.32	37.82	87.96		
662.00	6	438.69		16.00	14.52	3.50	3.29	39.30	59.79	53.48	248.80		
663.00	7	679.65		17.36	16.00	3.88	3.70	45.38	70.75	65.50	457.08		
		↑									↑		
		[Σ FLOWS (HOLES+RISER)]			(OUTFLOW THROUGH HOLES)						(FLOW OVER TOP OF RISER PIPE)		

Note:

1. Orifice outflow is based on:
   $Q=CA(2gH)^{0.5}$
   where:
   C = Coefficient, 0.6 used here
   A = Orifice Area
   H = Headwater

2. Top of riser overflow is based on:
   $Q=CLH^{1.5}$
   where:
   C = Coefficient, 2.8 used here based on sharp crested weir
   L = Weir Length
   H = Headwater

DETENTION/DEBRISBASIN #1

Total Stage-Storage-Outflow Summary

Elevation	Depth	Volume		Discharge
		(ft^3)	(ac-ft)	(cfs)
656.00	0	0	0	0
657.00	1.00	38,550	0.9	5.49
658.00	2.00	79,900	1.8	15.14
659.00	3.00	124,150	2.9	23.13
660.00	4.00	173,100	4.0	78.13
661.00	5.00	227,600	5.2	237.48
662.00	6.00	286,150	6.6	438.69
663.00	7.00	348,150	8.0	679.65

Note: Refer to Basin Volume Calculations for Volumes and
Refer to the outflow vs. depth calcualtions for discharges

UNIT HYDROGRAPH AND BASIN ROUTING ANALYSIS
TRACT 20317 IN CITY OF CHINO HILLS
2-YEAR STORM

Soil Loss and Low Loss Fraction Calculation
2-year Storm

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

TOTAL 24-HOUR DURATION RAINFALL DEPTH = 2.60 (inches)

SOIL-COVER TYPE	AREA (Acres)	PERCENT OF PERVIOUS AREA	SCS CURVE NUMBER	LOSS RATE Fp(in./hr.)	YIELD
1	183.20	100.00	86.(AMC II)	0.504	0.224

(Program would ask for input for AMC II) and converted to AMC I)

TOTAL AREA (Acres) = 183.20

AREA-AVERAGED LOSS RATE, Fm (in./hr.) = 0.504

AREA-AVERAGED LOW LOSS FRACTION, Y = 0.776

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UNIT HYDROGRAPH ANALYSIS

RATIONAL METHOD CALIBRATION COEFFICIENT = 1.17
TOTAL CATCHMENT AREA(ACRES) = 183.20
SOIL-LOSS RATE, Fm,(INCH/HR) = 0.504
LOW LOSS FRACTION = 0.776
TIME OF CONCENTRATION(MIN.) = 20.19
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
USER SPECIFIED RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 2
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.16
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.38
1-HOUR POINT RAINFALL VALUE(INCHES) = 0.55
3-HOUR POINT RAINFALL VALUE(INCHES) = 1.03
6-HOUR POINT RAINFALL VALUE(INCHES) = 1.46
24-HOUR POINT RAINFALL VALUE(INCHES) = 2.60

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 11.65
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 28.04

****

TIME (HOURS)	VOLUME (AF)	Q (CFS)		0.	25.0	50.0	75.0	100.0
0.18	0.0165	2.17	Q	.	.	.	.	
0.52	0.0770	2.18	Q	.	.	.	.	
0.86	0.1381	2.22	Q	.	.	.	.	
1.19	0.2000	2.24	Q	.	.	.	.	
1.53	0.2628	2.28	Q	.	.	.	.	
1.87	0.3263	2.30	Q	.	.	.	.	
2.20	0.3908	2.34	Q	.	.	.	.	
2.54	0.4561	2.36	Q	.	.	.	.	

2.88	0.5224	2.41	Q . . . .
3.21	0.5897	2.43	Q . . . .
3.55	0.6580	2.48	Q . . . .
3.89	0.7273	2.51	.Q . . . .
4.22	0.7978	2.56	.Q . . . .
4.56	0.8694	2.59	.Q . . . .
4.90	0.9422	2.65	.Q . . . .
5.23	1.0163	2.68	.Q . . . .
5.57	1.0918	2.75	.Q . . . .
5.90	1.1686	2.78	.Q . . . .
6.24	1.2469	2.85	.Q . . . .
6.58	1.3267	2.89	.Q . . . .
6.91	1.4082	2.97	.Q . . . .
7.25	1.4914	3.01	.Q . . . .
7.59	1.5764	3.10	.Q . . . .
7.92	1.6634	3.15	.Q . . . .
8.26	1.7525	3.25	.Q . . . .
8.60	1.8437	3.31	.Q . . . .
8.93	1.9374	3.43	.Q . . . .
9.27	2.0335	3.49	.Q . . . .
9.61	2.1324	3.63	.Q . . . .
9.94	2.2343	3.70	.Q . . . .
10.28	2.3394	3.86	.Q . . . .
10.62	2.4479	3.95	.Q . . . .
10.95	2.5604	4.14	.Q . . . .
11.29	2.6770	4.25	.Q . . . .
11.63	2.7983	4.48	.Q . . . .
11.96	2.9249	4.62	.Q . . . .
12.30	3.0692	5.76	. Q . . . .
12.63	3.2343	6.11	. Q . . . .
12.97	3.4100	6.52	. Q . . . .
13.31	3.5945	6.75	. Q . . . .
13.64	3.7901	7.31	. Q . . . .
13.98	3.9982	7.65	. Q . . . .
14.32	4.2369	9.52	. Q . . . .
14.65	4.5103	10.14	. Q . . . .
14.99	4.8125	11.59	. Q . . . .
15.33	5.1494	12.64	. Q . . . .
15.66	5.5388	15.37	. Q . . . .
16.00	6.0132	18.75	. Q . . . .
16.34	7.5518	91.90	. . . . Q .
16.67	9.0256	14.09	. Q . . . .
17.01	9.3715	10.79	. Q . . . .
17.35	9.6333	8.04	. Q . . . .
17.68	9.8427	7.02	. Q . . . .
18.02	10.0279	6.30	. Q . . . .
18.36	10.1818	4.76	.Q . . . .
18.69	10.3086	4.36	.Q . . . .
19.03	10.4254	4.04	.Q . . . .
19.36	10.5341	3.78	.Q . . . .
19.70	10.6360	3.56	.Q . . . .
20.04	10.7323	3.37	.Q . . . .
20.37	10.8236	3.20	.Q . . . .
20.71	10.9106	3.06	.Q . . . .
21.05	10.9938	2.93	.Q . . . .
21.38	11.0737	2.81	.Q . . . .
21.72	11.1506	2.71	.Q . . . .
22.06	11.2247	2.62	.Q . . . .
22.39	11.2963	2.53	.Q . . . .
22.73	11.3657	2.46	Q . . . .
23.07	11.4330	2.38	Q . . . .
23.40	11.4983	2.32	Q . . . .

23.74	11.5619	2.26	Q	.	.	.	.
24.08	11.6239	2.20	Q	.	.	.	.
24.41	11.6544	0.00	Q	.	.	.	.

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1453.7
10%	181.7
20%	40.4
30%	20.2
40%	20.2
50%	20.2
60%	20.2
70%	20.2
80%	20.2
90%	20.2

BASIN ROUTING ANALYSIS

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==============================================================================
   FLOW-THROUGH DETENTION BASIN MODEL

   SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
   CONSTANT HYDROGRAPH TIME UNIT(MINUTES) =   20.190
   DEAD STORAGE(AF) =       0.00
   SPECIFIED DEAD STORAGE(AF) FILLED =       0.00
   ASSUMED INITIAL DEPTH(FEET) IN STORAGE BASIN =    0.00


              INFLOW
                |
                |
                |
                V              __effective depth
           -------------         |   (and volume)
           |          |   |    |
           | detention |    |....V.............
           |   basin   |<-->|          outflow
           |          |   |.........__________
           -------------    |         |   \
                |         | storage |     basin outlet
                V          -----------
              OUTFLOW


   DEPTH-VS.-STORAGE AND DEPTH-VS.-DISCHARGE INFORMATION:
   TOTAL NUMBER OF BASIN DEPTH INFORMATION ENTRIES =   8
   *BASIN-DEPTH  STORAGE    OUTFLOW  **BASIN-DEPTH  STORAGE    OUTFLOW  *
   *   (FEET)  (ACRE-FEET)   (CFS)   **   (FEET)  (ACRE-FEET)   (CFS)   *
   *     0.000      0.000      0.000**      1.000      0.900      5.490*
   *     2.000      1.800     15.140**      3.000      2.900     23.130*
   *     4.000      4.000     78.130**      5.000      5.200    237.480*
   *     6.000      6.600    438.690**      7.000      8.000    679.650*
-----------------------------------------------------------------------------
   BASIN STORAGE, OUTFLOW AND DEPTH ROUTING VALUES:
    INTERVAL   DEPTH   {S-O*DT/2}   {S+O*DT/2}
     NUMBER   (FEET)   (ACRE-FEET)  (ACRE-FEET)
        1     0.00      0.00000      0.00000
        2     1.00      0.82366      0.97634
        3     2.00      1.58948      2.01052
        4     3.00      2.57838      3.22162
        5     4.00      2.91361      5.08639
        6     5.00      1.89785      8.50215
        7     6.00      0.50003     12.69997
        8     7.00     -1.45051     17.45051
   WHERE S=STORAGE(AF);O=OUTFLOW(AF/MIN.);DT=UNIT INTERVAL(MIN.)
-----------------------------------------------------------------------------
   DETENTION BASIN ROUTING RESULTS:
   NOTE: COMPUTED BASIN DEPTH, OUTFLOW, AND STORAGE QUANTITIES
       OCCUR AT THE GIVEN TIME. BASIN INFLOW VALUES REPRESENT THE
       AVERAGE INFLOW DURING THE RECENT HYDROGRAPH UNIT INTERVAL.

     TIME  DEAD-STORAGE  INFLOW  EFFECTIVE  OUTFLOW  EFFECTIVE
    (HRS)   FILLED(AF)    (CFS)  DEPTH(FT)   (CFS)   VOLUME(AF)
-----------------------------------------------------------------------------
     0.184       0.000     2.17      0.06     0.17      0.056
     0.521       0.000     2.18      0.11     0.48      0.103
```

0.857	0.000	2.22	0.16	0.75	0.144	
1.194	0.000	2.24	0.20	0.98	0.178	
1.530	0.000	2.28	0.23	1.18	0.209	
1.867	0.000	2.30	0.26	1.35	0.235	
2.203	0.000	2.34	0.29	1.50	0.258	
2.540	0.000	2.36	0.31	1.64	0.278	
2.876	0.000	2.41	0.33	1.75	0.297	
3.213	0.000	2.43	0.35	1.86	0.312	
3.549	0.000	2.48	0.36	1.95	0.327	
3.886	0.000	2.51	0.38	2.04	0.340	
4.222	0.000	2.56	0.39	2.11	0.353	
4.559	0.000	2.59	0.40	2.19	0.364	
4.895	0.000	2.65	0.42	2.25	0.375	
5.232	0.000	2.68	0.43	2.32	0.385	
5.568	0.000	2.75	0.44	2.38	0.395	
5.905	0.000	2.78	0.45	2.44	0.405	
6.241	0.000	2.85	0.46	2.50	0.414	
6.578	0.000	2.89	0.47	2.56	0.424	
6.914	0.000	2.97	0.48	2.61	0.434	
7.251	0.000	3.01	0.49	2.67	0.443	
7.588	0.000	3.10	0.50	2.73	0.453	
7.924	0.000	3.15	0.51	2.80	0.463	
8.260	0.000	3.25	0.53	2.86	0.474	
8.597	0.000	3.31	0.54	2.93	0.485	
8.934	0.000	3.43	0.55	2.99	0.497	
9.270	0.000	3.49	0.57	3.07	0.509	
9.607	0.000	3.63	0.58	3.14	0.522	
9.943	0.000	3.70	0.59	3.22	0.535	
10.280	0.000	3.86	0.61	3.31	0.550	
10.616	0.000	3.95	0.63	3.40	0.566	
10.952	0.000	4.14	0.65	3.50	0.583	
11.289	0.000	4.25	0.67	3.61	0.601	
11.625	0.000	4.48	0.69	3.73	0.622	
11.962	0.000	4.62	0.71	3.86	0.643	
12.298	0.000	5.76	0.77	4.07	0.690	
12.635	0.000	6.11	0.82	4.36	0.739	
12.971	0.000	6.52	0.88	4.66	0.790	
13.308	0.000	6.75	0.93	4.97	0.840	
13.644	0.000	7.31	1.00	5.29	0.896	
13.981	0.000	7.65	1.05	5.74	0.949	
14.318	0.000	9.52	1.15	6.47	1.034	
14.654	0.000	10.14	1.24	7.34	1.112	
14.990	0.000	11.59	1.34	8.26	1.204	
15.327	0.000	12.64	1.44	9.26	1.298	
15.663	0.000	15.37	1.59	10.49	1.434	
16.000	0.000	18.75	1.80	12.19	1.616	
16.337	0.000	**91.90**	3.41	29.47	3.353	**(Max. inflow)**
16.673	0.000	14.09	2.91	**34.07**	2.797	**(Max. outflow)**
17.010	0.000	10.79	2.64	21.32	2.504	
17.346	0.000	8.04	2.36	19.13	2.196	
17.682	0.000	7.02	2.11	17.00	1.918	
18.019	0.000	6.30	1.86	14.92	1.678	
18.355	0.000	4.76	1.62	12.66	1.459	
18.692	0.000	4.36	1.43	10.56	1.286	
19.028	0.000	4.04	1.28	8.91	1.151	
19.365	0.000	3.78	1.16	7.61	1.044	
19.701	0.000	3.56	1.07	6.59	0.960	
20.038	0.000	3.37	0.99	5.79	0.893	
20.375	0.000	3.20	0.93	5.27	0.835	
20.711	0.000	3.06	0.87	4.94	0.783	
21.047	0.000	2.93	0.82	4.63	0.736	

21.384	0.000	2.81	0.77	4.36	0.693
21.720	0.000	2.71	0.73	4.11	0.654
22.057	0.000	2.62	0.69	3.88	0.619
22.393	0.000	2.53	0.65	3.68	0.587
22.730	0.000	2.46	0.62	3.49	0.558
23.066	0.000	2.38	0.59	3.32	0.532
23.403	0.000	2.32	0.56	3.17	0.508
23.740	0.000	2.26	0.54	3.03	0.487
24.076	0.000	2.20	0.52	2.91	0.467
24.413	0.000	0.00	0.44	2.62	0.394
24.749	0.000	0.00	0.37	2.21	0.332
25.086	0.000	0.00	0.31	1.87	0.280
25.422	0.000	0.00	0.26	1.58	0.236
25.759	0.000	0.00	0.22	1.33	0.199
26.095	0.000	0.00	0.19	1.12	0.168
26.432	0.000	0.00	0.16	0.95	0.142
26.768	0.000	0.00	0.13	0.80	0.120
27.105	0.000	0.00	0.11	0.67	0.101
27.441	0.000	0.00	0.09	0.57	0.085
27.778	0.000	0.00	0.08	0.48	0.072
28.114	0.000	0.00	0.07	0.40	0.061
28.451	0.000	0.00	0.06	0.34	0.051
28.787	0.000	0.00	0.05	0.29	0.043
29.124	0.000	0.00	0.04	0.24	0.036
29.460	0.000	0.00	0.03	0.20	0.031
29.797	0.000	0.00	0.03	0.17	0.026
30.133	0.000	0.00	0.02	0.15	0.022
30.470	0.000	0.00	0.02	0.12	0.018
30.806	0.000	0.00	0.02	0.10	0.016
31.143	0.000	0.00	0.01	0.09	0.013
31.479	0.000	0.00	0.01	0.07	0.011
31.816	0.000	0.00	0.01	0.06	0.009
32.152	0.000	0.00	0.01	0.05	0.008
32.489	0.000	0.00	0.01	0.04	0.007
32.825	0.000	0.00	0.01	0.04	0.006
33.161	0.000	0.00	0.01	0.03	0.005
33.498	0.000	0.00	0.00	0.03	0.004
33.834	0.000	0.00	0.00	0.02	0.003
34.171	0.000	0.00	0.00	0.02	0.003
34.507	0.000	0.00	0.00	0.02	0.002
34.844	0.000	0.00	0.00	0.01	0.002
35.180	0.000	0.00	0.00	0.01	0.002
35.517	0.000	0.00	0.00	0.01	0.001
35.853	0.000	0.00	0.00	0.01	0.001
36.190	0.000	0.00	0.00	0.01	0.001

UNIT HYDROGRAPH AND BASIN ROUTING ANALYSIS
TRACT 20317 IN CITY OF CHINO HILLS
25-YEAR STORM

Soil Loss and Low Loss Fraction Calculation
25-year Storm

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

TOTAL 24-HOUR DURATION RAINFALL DEPTH = 5.16 (inches)

SOIL-COVER TYPE	AREA (Acres)	PERCENT OF PERVIOUS AREA	SCS CURVE NUMBER	LOSS RATE Fp(in./hr.)	YIELD
1	183.20	100.00	86.(AMC II)	0.272	0.701

TOTAL AREA (Acres) = 183.20

AREA-AVERAGED LOSS RATE, Fm (in./hr.) = 0.272

AREA-AVERAGED LOW LOSS FRACTION, Y = 0.299

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UNIT HYDROGRAPH ANALYSIS

RATIONAL METHOD CALIBRATION COEFFICIENT = 1.06
TOTAL CATCHMENT AREA(ACRES) = 183.20
SOIL-LOSS RATE, Fm,(INCH/HR) = 0.272
LOW LOSS FRACTION = 0.299
TIME OF CONCENTRATION(MIN.) = 17.88
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
USER SPECIFIED RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 25
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.31
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.75
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.09
3-HOUR POINT RAINFALL VALUE(INCHES) = 2.01
6-HOUR POINT RAINFALL VALUE(INCHES) = 2.85
24-HOUR POINT RAINFALL VALUE(INCHES) = 5.16

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 59.80
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 18.97

****

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	82.5	165.0	247.5	330.0
0.21	0.1072	12.59	.Q	.	.	.	.
0.50	0.4182	12.66	.Q	.	.	.	.
0.80	0.7323	12.85	.Q	.	.	.	.
1.10	1.0499	12.94	.Q	.	.	.	.
1.40	1.3710	13.14	.Q	.	.	.	.
1.70	1.6959	13.24	.Q	.	.	.	.
1.99	2.0247	13.45	.Q	.	.	.	.
2.29	2.3573	13.56	.Q	.	.	.	.

```
 2.59    2.6941    13.79 .Q      .      .      .      .
 2.89    3.0351    13.90 .Q      .      .      .      .
 3.19    3.3805    14.14 .Q      .      .      .      .
 3.48    3.7304    14.27 .Q      .      .      .      .
 3.78    4.0850    14.53 .Q      .      .      .      .
 4.08    4.4445    14.66 .Q      .      .      .      .
 4.38    4.8090    14.94 .Q      .      .      .      .
 4.68    5.1789    15.09 .Q      .      .      .      .
 4.97    5.5542    15.39 .Q      .      .      .      .
 5.27    5.9352    15.55 .Q      .      .      .      .
 5.57    6.3223    15.88 .Q      .      .      .      .
 5.87    6.7155    16.05 .Q      .      .      .      .
 6.17    7.1153    16.41 .Q      .      .      .      .
 6.46    7.5218    16.60 . Q     .      .      .      .
 6.76    7.9355    17.00 . Q     .      .      .      .
 7.06    8.3567    17.21 . Q     .      .      .      .
 7.36    8.7859    17.64 . Q     .      .      .      .
 7.66    9.2232    17.87 . Q     .      .      .      .
 7.95    9.6694    18.36 . Q     .      .      .      .
 8.25   10.1249    18.62 . Q     .      .      .      .
 8.55   10.5902    19.17 . Q     .      .      .      .
 8.85   11.0658    19.46 . Q     .      .      .      .
 9.15   11.5526    20.08 . Q     .      .      .      .
 9.44   12.0512    20.41 . Q     .      .      .      .
 9.74   12.5625    21.12 . Q     .      .      .      .
10.04   13.0873    21.50 . Q     .      .      .      .
10.34   13.6268    22.32 . Q     .      .      .      .
10.64   14.1820    22.76 . Q     .      .      .      .
10.93   14.7546    23.73 . Q     .      .      .      .
11.23   15.3455    24.26 . Q     .      .      .      .
11.53   15.9573    25.42 .  Q    .      .      .      .
11.83   16.5912    26.06 .  Q    .      .      .      .
12.13   17.2586    28.14 .  Q    .      .      .      .
12.42   18.0139    33.19 .   Q   .      .      .      .
12.72   18.8539    35.02 .   Q   .      .      .      .
13.02   19.7293    36.06 .   Q   .      .      .      .
13.32   20.6468    38.45 .   Q   .      .      .      .
13.62   21.6109    39.84 .   Q   .      .      .      .
13.91   22.6328    43.14 .    Q  .      .      .      .
14.21   23.7239    45.46 .    Q  .      .      .      .
14.51   24.9601    54.93 .     Q .      .      .      .
14.81   26.3517    58.07 .     Q .      .      .      .
15.11   27.8876    66.65 .      Q.      .      .      .
15.40   29.6058    72.88 .      Q.      .      .      .
15.70   31.6402    92.33 .       .Q     .      .      .
16.00   34.1504   111.52 .       . Q    .      .      .
16.30   39.5475   326.76 .       .      .      .      Q.
16.60   44.5638    80.60 .      Q.      .      .      .
16.89   46.3184    61.88 .     Q .      .      .      .
17.19   47.7243    52.29 .    Q  .      .      .      .
17.49   48.8779    41.39 .   Q   .      .      .      .
17.79   49.8457    37.20 .  Q    .      .      .      .
18.09   50.7233    34.07 .  Q    .      .      .      .
18.38   51.4722    26.75 . Q     .      .      .      .
18.68   52.1072    24.82 . Q     .      .      .      .
18.98   52.6989    23.23 . Q     .      .      .      .
19.28   53.2547    21.90 . Q     .      .      .      .
19.58   53.7799    20.75 . Q     .      .      .      .
19.87   54.2788    19.76 . Q     .      .      .      .
20.17   54.7547    18.89 . Q     .      .      .      .
20.47   55.2104    18.11 . Q     .      .      .      .
20.77   55.6480    17.42 . Q     .      .      .      .
```

```
21.07    56.0693    16.80  . Q     .     .     .     .
21.36    56.4760    16.23  .Q      .     .     .     .
21.66    56.8693    15.71  .Q      .     .     .     .
21.96    57.2505    15.24  .Q      .     .     .     .
22.26    57.6204    14.80  .Q      .     .     .     .
22.56    57.9799    14.40  .Q      .     .     .     .
22.85    58.3299    14.02  .Q      .     .     .     .
23.15    58.6709    13.67  .Q      .     .     .     .
23.45    59.0037    13.35  .Q      .     .     .     .
23.75    59.3286    13.04  .Q      .     .     .     .
24.05    59.6463    12.75  .Q      .     .     .     .
24.34    59.8033     0.00  Q       .     .     .     .
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
```

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1448.3
10%	357.6
20%	107.3
30%	35.8
40%	17.9
50%	17.9
60%	17.9
70%	17.9
80%	17.9
90%	17.9

BASIN ROUTING ANALYSIS

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==============================================================================
   FLOW-THROUGH DETENTION BASIN MODEL

   SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
   CONSTANT HYDROGRAPH TIME UNIT(MINUTES) =   17.880
   DEAD STORAGE(AF) =       0.00
   SPECIFIED DEAD STORAGE(AF) FILLED =       0.00
   ASSUMED INITIAL DEPTH(FEET) IN STORAGE BASIN =    0.00


              INFLOW
                |
                |
                |
                V              __effective depth
           -------------         |   (and volume)
           |          |    |    |
           | detention |    |....V.............
           |   basin   |<-->|          outflow
           |          |    |.........__________
           -------------    |         |   \
                |         | storage |     basin outlet
                V          -----------
              OUTFLOW


   DEPTH-VS.-STORAGE AND DEPTH-VS.-DISCHARGE INFORMATION:
   TOTAL NUMBER OF BASIN DEPTH INFORMATION ENTRIES =   8
   *BASIN-DEPTH  STORAGE    OUTFLOW  **BASIN-DEPTH  STORAGE    OUTFLOW  *
   *   (FEET)  (ACRE-FEET)   (CFS)   **   (FEET)  (ACRE-FEET)   (CFS)   *
   *     0.000      0.000      0.000**      1.000      0.900      5.490*
   *     2.000      1.800     15.140**      3.000      2.900     23.130*
   *     4.000      4.000     78.130**      5.000      5.200    237.480*
   *     6.000      6.600    438.690**      7.000      8.000    679.650*
-----------------------------------------------------------------------------
   BASIN STORAGE, OUTFLOW AND DEPTH ROUTING VALUES:
    INTERVAL   DEPTH   {S-O*DT/2}   {S+O*DT/2}
     NUMBER   (FEET)   (ACRE-FEET)  (ACRE-FEET)
        1     0.00      0.00000      0.00000
        2     1.00      0.83240      0.96760
        3     2.00      1.61357      1.98643
        4     3.00      2.61518      3.18482
        5     4.00      3.03790      4.96210
        6     5.00      2.27566      8.12434
        7     6.00      1.19795     12.00205
        8     7.00     -0.36924     16.36924
   WHERE S=STORAGE(AF);O=OUTFLOW(AF/MIN.);DT=UNIT INTERVAL(MIN.)
-----------------------------------------------------------------------------
   DETENTION BASIN ROUTING RESULTS:
   NOTE: COMPUTED BASIN DEPTH, OUTFLOW, AND STORAGE QUANTITIES
       OCCUR AT THE GIVEN TIME. BASIN INFLOW VALUES REPRESENT THE
       AVERAGE INFLOW DURING THE RECENT HYDROGRAPH UNIT INTERVAL.

     TIME  DEAD-STORAGE  INFLOW  EFFECTIVE  OUTFLOW  EFFECTIVE
    (HRS)   FILLED(AF)    (CFS)  DEPTH(FT)   (CFS)   VOLUME(AF)
-----------------------------------------------------------------------------
     0.206       0.000    12.59      0.32     0.88      0.288
     0.504       0.000    12.66      0.60     2.52      0.538
     0.802       0.000    12.85      0.84     3.95      0.757
```

1.100	0.000	12.94	1.05	5.30	0.946	
1.398	0.000	13.14	1.22	6.81	1.101	
1.696	0.000	13.24	1.36	8.30	1.223	
1.994	0.000	13.45	1.47	9.48	1.321	
2.292	0.000	13.56	1.55	10.42	1.398	
2.590	0.000	13.79	1.63	11.18	1.463	
2.888	0.000	13.90	1.68	11.80	1.514	
3.186	0.000	14.14	1.73	12.32	1.559	
3.484	0.000	14.27	1.77	12.76	1.597	
3.782	0.000	14.53	1.81	13.14	1.631	
4.080	0.000	14.66	1.84	13.48	1.660	
4.378	0.000	14.94	1.88	13.79	1.688	
4.676	0.000	15.09	1.90	14.08	1.713	
4.974	0.000	15.39	1.93	14.35	1.739	
5.272	0.000	15.55	1.96	14.61	1.762	
5.570	0.000	15.88	1.99	14.87	1.787	
5.868	0.000	16.05	2.01	15.11	1.810	
6.166	0.000	16.41	2.03	15.31	1.837	
6.464	0.000	16.60	2.06	15.51	1.864	
6.762	0.000	17.00	2.09	15.72	1.896	
7.060	0.000	17.21	2.12	15.95	1.927	
7.358	0.000	17.64	2.15	16.19	1.962	
7.656	0.000	17.87	2.18	16.45	1.998	
7.954	0.000	18.36	2.22	16.72	2.038	
8.252	0.000	18.62	2.25	17.01	2.078	
8.550	0.000	19.17	2.29	17.32	2.123	
8.848	0.000	19.46	2.33	17.65	2.168	
9.146	0.000	20.08	2.38	18.00	2.219	
9.444	0.000	20.41	2.43	18.37	2.269	
9.742	0.000	21.12	2.48	18.76	2.327	
10.040	0.000	21.50	2.53	19.18	2.384	
10.338	0.000	22.32	2.59	19.63	2.451	
10.636	0.000	22.76	2.65	20.10	2.516	
10.934	0.000	23.73	2.72	20.62	2.593	
11.232	0.000	24.26	2.79	21.17	2.669	
11.530	0.000	25.42	2.87	21.78	2.759	
11.828	0.000	26.06	2.95	22.43	2.848	
12.126	0.000	28.14	3.04	24.12	2.947	
12.424	0.000	33.19	3.15	28.42	3.065	
12.722	0.000	35.02	3.20	32.76	3.120	
13.020	0.000	36.06	3.23	34.88	3.150	
13.318	0.000	38.45	3.27	36.69	3.193	
13.616	0.000	39.84	3.29	38.56	3.224	
13.914	0.000	43.14	3.35	40.79	3.282	
14.212	0.000	45.46	3.39	43.47	3.331	
14.510	0.000	54.93	3.53	48.60	3.487	
14.808	0.000	58.07	3.61	54.62	3.572	
15.106	0.000	66.65	3.75	60.52	3.723	
15.404	0.000	72.88	3.87	67.57	3.854	
15.702	0.000	92.33	4.09	81.88	4.111	
16.000	0.000	111.52	4.24	104.47	4.285	
16.298	0.000	**326.76**	5.72	**248.87**	6.204	**(Max. inflow and outflow)**
16.596	0.000	80.60	3.17	207.12	3.088	
16.894	0.000	61.88	3.58	43.71	3.535	
17.192	0.000	52.29	3.54	53.90	3.496	
17.490	0.000	41.39	3.38	48.52	3.320	
17.788	0.000	37.20	3.29	41.49	3.214	
18.086	0.000	34.07	3.22	37.03	3.142	
18.384	0.000	26.75	3.10	31.98	3.013	
18.682	0.000	24.82	3.05	27.26	2.953	
18.980	0.000	23.23	3.01	24.80	2.914	
19.278	0.000	21.90	2.98	23.40	2.877	

19.576	0.000	20.75	2.93	22.78	2.827
19.874	0.000	19.76	2.88	22.37	2.763
20.172	0.000	18.89	2.81	21.87	2.690
20.470	0.000	18.11	2.74	21.32	2.611
20.768	0.000	17.42	2.66	20.73	2.529
21.066	0.000	16.80	2.59	20.14	2.447
21.364	0.000	16.23	2.51	19.54	2.365
21.662	0.000	15.71	2.44	18.96	2.285
21.960	0.000	15.24	2.37	18.38	2.208
22.258	0.000	14.80	2.30	17.83	2.133
22.556	0.000	14.40	2.24	17.30	2.062
22.854	0.000	14.02	2.18	16.79	1.994
23.152	0.000	13.67	2.12	16.31	1.929
23.450	0.000	13.35	2.06	15.85	1.867
23.748	0.000	13.04	2.01	15.41	1.809
24.046	0.000	12.75	1.95	14.93	1.755
24.344	0.000	0.00	1.60	12.95	1.436
24.642	0.000	0.00	1.32	9.93	1.192
24.940	0.000	0.00	1.12	7.61	1.004
25.238	0.000	0.00	0.95	5.92	0.858
25.536	0.000	0.00	0.82	4.87	0.738
25.834	0.000	0.00	0.71	4.19	0.635
26.132	0.000	0.00	0.61	3.60	0.546
26.430	0.000	0.00	0.52	3.10	0.470
26.728	0.000	0.00	0.45	2.67	0.404
27.026	0.000	0.00	0.39	2.29	0.348
27.324	0.000	0.00	0.33	1.97	0.299
27.622	0.000	0.00	0.29	1.70	0.257
27.920	0.000	0.00	0.25	1.46	0.221
28.218	0.000	0.00	0.21	1.26	0.191
28.516	0.000	0.00	0.18	1.08	0.164
28.814	0.000	0.00	0.16	0.93	0.141
29.112	0.000	0.00	0.13	0.80	0.121
29.410	0.000	0.00	0.12	0.69	0.104
29.708	0.000	0.00	0.10	0.59	0.090
30.006	0.000	0.00	0.09	0.51	0.077
30.304	0.000	0.00	0.07	0.44	0.066
30.602	0.000	0.00	0.06	0.38	0.057
30.900	0.000	0.00	0.05	0.32	0.049
31.198	0.000	0.00	0.05	0.28	0.042
31.496	0.000	0.00	0.04	0.24	0.036
31.794	0.000	0.00	0.03	0.21	0.031
32.092	0.000	0.00	0.03	0.18	0.027
32.390	0.000	0.00	0.03	0.15	0.023
32.688	0.000	0.00	0.02	0.13	0.020
32.986	0.000	0.00	0.02	0.11	0.017
33.284	0.000	0.00	0.02	0.10	0.015
33.582	0.000	0.00	0.01	0.08	0.013
33.880	0.000	0.00	0.01	0.07	0.011
34.178	0.000	0.00	0.01	0.06	0.009
34.476	0.000	0.00	0.01	0.05	0.008
34.774	0.000	0.00	0.01	0.05	0.007
35.072	0.000	0.00	0.01	0.04	0.006
35.370	0.000	0.00	0.01	0.03	0.005
35.668	0.000	0.00	0.00	0.03	0.004
35.966	0.000	0.00	0.00	0.03	0.004
36.264	0.000	0.00	0.00	0.02	0.003
36.562	0.000	0.00	0.00	0.02	0.003
36.860	0.000	0.00	0.00	0.02	0.002
37.158	0.000	0.00	0.00	0.01	0.002
37.456	0.000	0.00	0.00	0.01	0.002
37.754	0.000	0.00	0.00	0.01	0.002

38.052	0.000	0.00	0.00	0.01	0.001
38.350	0.000	0.00	0.00	0.01	0.001
38.648	0.000	0.00	0.00	0.01	0.001

UNIT HYDROGRAPH AND BASIN ROUTING ANALYSIS
TRACT 20317 IN CITY OF CHINO HILLS
100-YEAR STORM

Soil Loss and Low Loss Fraction Calculation
100-year Storm

==========

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

TOTAL 24-HOUR DURATION RAINFALL DEPTH = 6.71 (inches)

SOIL-COVER TYPE	AREA (Acres)	PERCENT OF PERVIOUS AREA	SCS CURVE NUMBER	LOSS RATE Fp(in./hr.)	YIELD
1	183.20	100.00	86.(AMC II)	0.106	0.947

(Program would ask for input for AMC II) and converted to AMC III)

TOTAL AREA (Acres) = 183.20

AREA-AVERAGED LOSS RATE, Fm (in./hr.) = 0.106

AREA-AVERAGED LOW LOSS FRACTION, Y = 0.053

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UNIT HYDROGRAPH ANALYSIS

RATIONAL METHOD CALIBRATION COEFFICIENT = 1.04
TOTAL CATCHMENT AREA(ACRES) = 183.20
SOIL-LOSS RATE, Fm,(INCH/HR) = 0.106
LOW LOSS FRACTION = 0.053
TIME OF CONCENTRATION(MIN.) = 17.25
SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
USER SPECIFIED RAINFALL VALUES ARE USED
RETURN FREQUENCY(YEARS) = 100
5-MINUTE POINT RAINFALL VALUE(INCHES) = 0.41
30-MINUTE POINT RAINFALL VALUE(INCHES) = 0.99
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.43
3-HOUR POINT RAINFALL VALUE(INCHES) = 2.63
6-HOUR POINT RAINFALL VALUE(INCHES) = 3.71
24-HOUR POINT RAINFALL VALUE(INCHES) = 6.71

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 100.62
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 1.82

****

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	122.5	245.0	367.5	490.0
0.19	0.1677	21.65	.Q	.	.	.	.
0.47	0.6834	21.76	.Q	.	.	.	.
0.76	1.2040	22.07	.Q	.	.	.	.
1.05	1.7303	22.23	.Q	.	.	.	.
1.34	2.2622	22.55	.Q	.	.	.	.
1.62	2.8001	22.72	.Q	.	.	.	.

```
 1.91    3.3440    23.07 .Q      .      .      .      .
 2.20    3.8942    23.25 .Q      .      .      .      .
 2.49    4.4510    23.62 .Q      .      .      .      .
 2.78    5.0144    23.81 .Q      .      .      .      .
 3.06    5.5848    24.20 .Q      .      .      .      .
 3.35    6.1623    24.41 .Q      .      .      .      .
 3.64    6.7473    24.83 . Q     .      .      .      .
 3.92    7.3399    25.05 . Q     .      .      .      .
 4.21    7.9406    25.51 . Q     .      .      .      .
 4.50    8.5495    25.74 . Q     .      .      .      .
 4.79    9.1670    26.24 . Q     .      .      .      .
 5.07    9.7935    26.49 . Q     .      .      .      .
 5.36   10.4293    27.03 . Q     .      .      .      .
 5.65   11.0747    27.30 . Q     .      .      .      .
 5.94   11.7303    27.88 . Q     .      .      .      .
 6.22   12.3964    28.19 . Q     .      .      .      .
 6.51   13.0736    28.82 . Q     .      .      .      .
 6.80   13.7624    29.15 . Q     .      .      .      .
 7.09   14.4633    29.85 . Q     .      .      .      .
 7.38   15.1768    30.21 . Q     .      .      .      .
 7.66   15.9039    30.98 . Q     .      .      .      .
 7.95   16.6449    31.39 . Q     .      .      .      .
 8.24   17.4009    32.25 . Q     .      .      .      .
 8.52   18.1725    32.70 . Q     .      .      .      .
 8.81   18.9609    33.66 . Q     .      .      .      .
 9.10   19.7669    34.17 . Q     .      .      .      .
 9.39   20.5918    35.26 . Q     .      .      .      .
 9.68   21.4366    35.85 . Q     .      .      .      .
 9.96   22.3031    37.09 .  Q    .      .      .      .
10.25   23.1924    37.76 .  Q    .      .      .      .
10.54   24.1068    39.21 .  Q    .      .      .      .
10.82   25.0477    39.99 .  Q    .      .      .      .
11.11   26.0181    41.69 .  Q    .      .      .      .
11.40   27.0197    42.62 .  Q    .      .      .      .
11.69   28.0566    44.66 .  Q    .      .      .      .
11.98   29.1312    45.79 .  Q    .      .      .      .
12.26   30.3286    55.01 .   Q   .      .      .      .
12.55   31.6645    57.44 .   Q   .      .      .      .
12.84   33.0675    60.66 .   Q   .      .      .      .
13.12   34.5304    62.48 .    Q  .      .      .      .
13.41   36.0650    66.69 .    Q  .      .      .      .
13.70   37.6785    69.13 .    Q  .      .      .      .
13.99   39.3902    74.95 .     Q .      .      .      .
14.27   41.2606    82.48 .     Q .      .      .      .
14.56   43.3854    96.38 .     Q .      .      .      .
14.85   45.7411   101.91 .      Q.      .      .      .
15.14   48.3425   117.06 .      Q.      .      .      .
15.43   51.2544   128.06 .       Q      .      .      .
15.71   54.6880   160.96 .       . Q    .      .      .
16.00   58.9329   196.36 .       .   Q  .      .      .
16.29   66.9754   480.61 .       .      .      .      Q.
16.58   74.3530   140.39 .       .Q     .      .      .
16.86   77.3115   108.64 .      Q.      .      .      .
17.15   79.6916    91.71 .     Q .      .      .      .
17.44   81.6350    71.87 .    Q  .      .      .      .
17.73   83.2548    64.48 .    Q  .      .      .      .
18.01   84.7216    58.98 .   Q   .      .      .      .
18.30   85.9807    46.99 .  Q    .      .      .      .
18.59   87.0570    43.61 .  Q    .      .      .      .
18.88   88.0600    40.82 .  Q    .      .      .      .
19.16   89.0019    38.47 .  Q    .      .      .      .
19.45   89.8920    36.45 . Q     .      .      .      .
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19.74    90.7374    34.71  . Q     .     .     .     .
20.02    91.5438    33.17  . Q     .     .     .     .
20.31    92.3158    31.81  . Q     .     .     .     .
20.60    93.0572    30.59  . Q     .     .     .     .
20.89    93.7710    29.49  . Q     .     .     .     .
21.17    94.4600    28.50  . Q     .     .     .     .
21.46    95.1263    27.59  . Q     .     .     .     .
21.75    95.7719    26.76  . Q     .     .     .     .
22.04    96.3985    25.99  . Q     .     .     .     .
22.33    97.0075    25.28  . Q     .     .     .     .
22.61    97.6003    24.62  . Q     .     .     .     .
22.90    98.1779    24.00  .Q      .     .     .     .
23.19    98.7414    23.43  .Q      .     .     .     .
23.48    99.2917    22.89  .Q      .     .     .     .
23.76    99.8296    22.39  .Q      .     .     .     .
24.05   100.3559    21.91  .Q      .     .     .     .
24.34   100.6162     0.00  Q       .     .     .     .
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TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1449.0
10%	362.2
20%	155.2
30%	51.8
40%	34.5
50%	17.2
60%	17.2
70%	17.2
80%	17.2
90%	17.2

BASIN ROUTING ANALYSIS

```
==============================================================================
   FLOW-THROUGH DETENTION BASIN MODEL

   SPECIFIED BASIN CONDITIONS ARE AS FOLLOWS:
   CONSTANT HYDROGRAPH TIME UNIT(MINUTES) =   17.250
   DEAD STORAGE(AF) =       0.00
   SPECIFIED DEAD STORAGE(AF) FILLED =       0.00
   ASSUMED INITIAL DEPTH(FEET) IN STORAGE BASIN =    0.00


              INFLOW
                |
                |
                |
                V              __effective depth
           -------------         |   (and volume)
           |          |    |    |
           | detention |    |....V.............
           |   basin   |<-->|          outflow
           |          |    |.........__________
           -------------    |         |   \
                |         | storage |     basin outlet
                V          -----------
              OUTFLOW


   DEPTH-VS.-STORAGE AND DEPTH-VS.-DISCHARGE INFORMATION:
   TOTAL NUMBER OF BASIN DEPTH INFORMATION ENTRIES =   8
   *BASIN-DEPTH  STORAGE    OUTFLOW  **BASIN-DEPTH  STORAGE    OUTFLOW  *
   *   (FEET)  (ACRE-FEET)   (CFS)   **   (FEET)  (ACRE-FEET)   (CFS)   *
   *     0.000      0.000      0.000**      1.000      0.900      5.490*
   *     2.000      1.800     15.140**      3.000      2.900     23.130*
   *     4.000      4.000     78.130**      5.000      5.200    237.480*
   *     6.000      6.600    438.690**      7.000      8.000    679.650*
-----------------------------------------------------------------------------
   BASIN STORAGE, OUTFLOW AND DEPTH ROUTING VALUES:
    INTERVAL   DEPTH   {S-O*DT/2}   {S+O*DT/2}
     NUMBER   (FEET)   (ACRE-FEET)  (ACRE-FEET)
        1     0.00      0.00000      0.00000
        2     1.00      0.83478      0.96522
        3     2.00      1.62013      1.97987
        4     3.00      2.62521      3.17479
        5     4.00      3.07180      4.92820
        6     5.00      2.37870      8.02130
        7     6.00      1.38829     11.81171
        8     7.00     -0.07436     16.07435
   WHERE S=STORAGE(AF);O=OUTFLOW(AF/MIN.);DT=UNIT INTERVAL(MIN.)
-----------------------------------------------------------------------------
   DETENTION BASIN ROUTING RESULTS:
   NOTE: COMPUTED BASIN DEPTH, OUTFLOW, AND STORAGE QUANTITIES
       OCCUR AT THE GIVEN TIME. BASIN INFLOW VALUES REPRESENT THE
       AVERAGE INFLOW DURING THE RECENT HYDROGRAPH UNIT INTERVAL.

     TIME  DEAD-STORAGE  INFLOW  EFFECTIVE  OUTFLOW  EFFECTIVE
    (HRS)   FILLED(AF)    (CFS)  DEPTH(FT)   (CFS)   VOLUME(AF)
-----------------------------------------------------------------------------
     0.188       0.000    21.65      0.53     1.46      0.480
     0.475       0.000    21.76      1.00     4.20      0.897
     0.762       0.000    22.07      1.39     7.34      1.247
```

1.050	0.000	22.23	1.69	10.68	1.521	
1.337	0.000	22.55	1.93	13.33	1.740	
1.625	0.000	22.72	2.11	15.25	1.918	
1.913	0.000	23.07	2.25	16.56	2.073	
2.200	0.000	23.25	2.37	17.61	2.207	
2.487	0.000	23.62	2.48	18.53	2.327	
2.775	0.000	23.81	2.58	19.36	2.433	
3.062	0.000	24.20	2.66	20.09	2.531	
3.350	0.000	24.41	2.74	20.76	2.617	
3.638	0.000	24.83	2.82	21.38	2.700	
3.925	0.000	25.05	2.88	21.94	2.773	
4.213	0.000	25.51	2.95	22.47	2.846	
4.500	0.000	25.74	3.01	23.13	2.908	
4.787	0.000	26.24	3.04	24.53	2.948	
5.075	0.000	26.49	3.06	25.90	2.962	
5.363	0.000	27.03	3.07	26.54	2.974	
5.650	0.000	27.30	3.07	27.01	2.981	
5.938	0.000	27.88	3.08	27.44	2.991	
6.225	0.000	28.19	3.09	27.88	2.999	
6.512	0.000	28.82	3.10	28.35	3.010	
6.800	0.000	29.15	3.11	28.82	3.018	
7.088	0.000	29.85	3.12	29.33	3.030	
7.375	0.000	30.21	3.13	29.85	3.039	
7.662	0.000	30.98	3.14	30.41	3.052	
7.950	0.000	31.39	3.15	30.99	3.062	
8.238	0.000	32.25	3.16	31.61	3.077	
8.525	0.000	32.70	3.17	32.25	3.088	
8.812	0.000	33.66	3.19	32.95	3.105	
9.100	0.000	34.17	3.20	33.67	3.117	
9.387	0.000	35.26	3.21	34.45	3.136	
9.675	0.000	35.85	3.23	35.27	3.150	
9.962	0.000	37.09	3.25	36.16	3.172	
10.250	0.000	37.76	3.26	37.11	3.187	
10.538	0.000	39.21	3.28	38.13	3.213	
10.825	0.000	39.99	3.30	39.23	3.231	
11.113	0.000	41.69	3.33	40.43	3.261	
11.400	0.000	42.62	3.35	41.72	3.282	
11.688	0.000	44.66	3.38	43.15	3.318	
11.975	0.000	45.79	3.40	44.70	3.344	
12.262	0.000	55.01	3.53	48.94	3.488	
12.550	0.000	57.44	3.60	54.37	3.561	
12.837	0.000	60.66	3.66	57.86	3.628	
13.125	0.000	62.48	3.70	60.62	3.672	
13.413	0.000	66.69	3.77	63.58	3.746	
13.700	0.000	69.13	3.82	66.81	3.801	
13.988	0.000	74.95	3.91	70.71	3.902	
14.275	0.000	82.48	4.02	77.32	4.025	
14.562	0.000	96.38	4.14	90.57	4.163	
14.850	0.000	101.91	4.15	101.07	4.183	
15.137	0.000	117.06	4.26	111.37	4.318	
15.425	0.000	128.06	4.32	125.06	4.389	
15.712	0.000	160.96	4.56	148.86	4.676	
16.000	0.000	196.36	4.78	185.33	4.938	
16.288	0.000	480.61	**6.50**	381.13	7.302	**(Max. Water Surface Elev=656+6.5=662.5')**
16.575	0.000	140.39	3.47	304.12	3.412	
16.862	0.000	108.64	4.16	75.94	4.189	
17.150	0.000	91.71	4.07	96.16	4.083	
17.438	0.000	71.87	3.89	80.55	3.877	
17.725	0.000	64.48	3.79	69.17	3.765	
18.013	0.000	58.98	3.69	63.63	3.655	
18.300	0.000	46.99	3.50	55.70	3.448	
18.587	0.000	43.61	3.40	47.95	3.345	

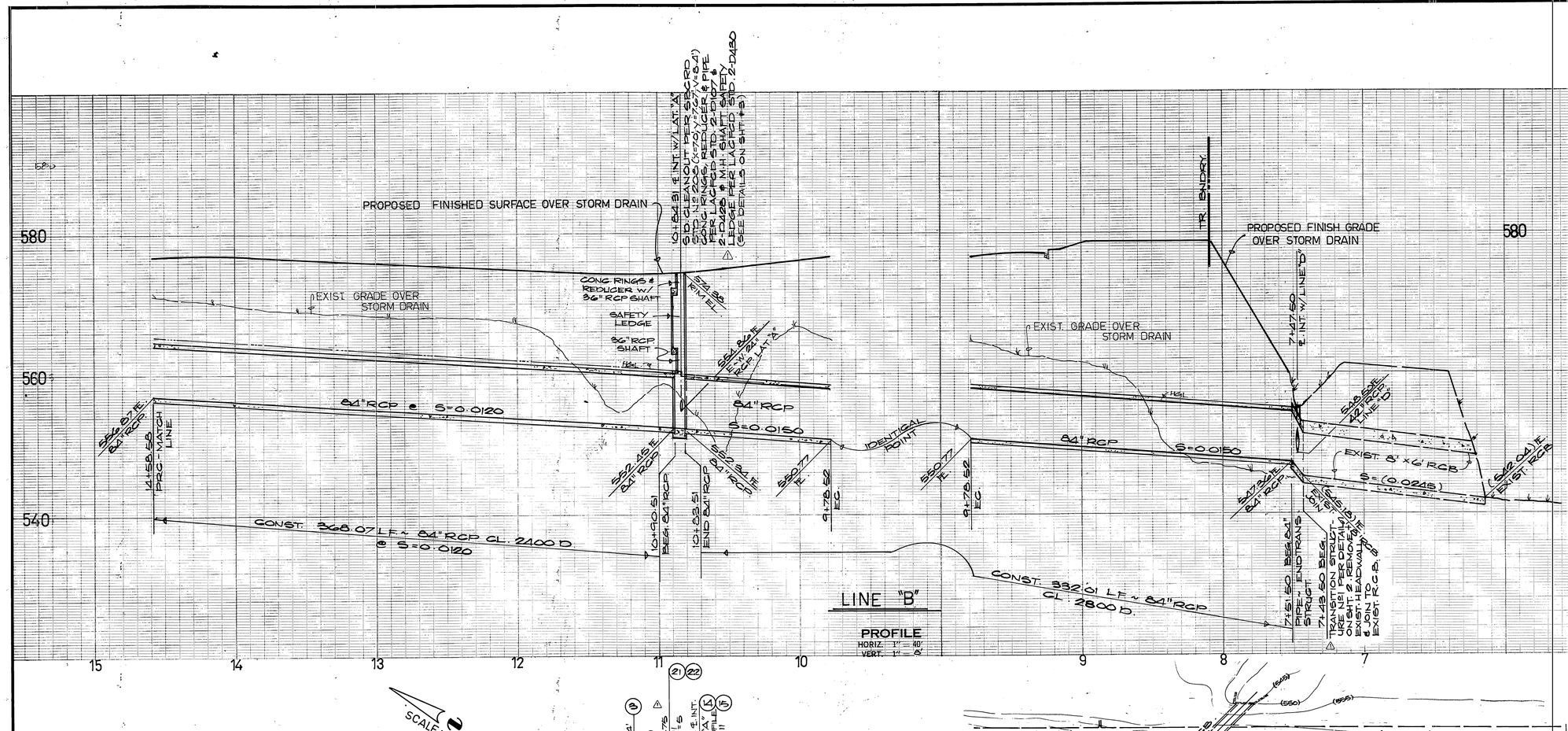
18.875	0.000	40.82	3.34	43.67	3.277
19.163	0.000	38.47	3.30	40.67	3.225
19.450	0.000	36.45	3.26	38.28	3.181
19.737	0.000	34.71	3.22	36.27	3.144
20.025	0.000	33.17	3.19	34.53	3.112
20.312	0.000	31.81	3.17	33.01	3.083
20.600	0.000	30.59	3.14	31.66	3.058
20.888	0.000	29.49	3.12	30.46	3.035
21.175	0.000	28.50	3.10	29.37	3.014
21.462	0.000	27.59	3.09	28.38	2.996
21.750	0.000	26.76	3.07	27.48	2.978
22.038	0.000	25.99	3.06	26.65	2.963
22.325	0.000	25.28	3.04	25.89	2.948
22.612	0.000	24.62	3.03	25.19	2.934
22.900	0.000	24.00	3.02	24.53	2.922
23.188	0.000	23.43	3.01	23.92	2.910
23.475	0.000	22.89	3.00	23.38	2.899
23.763	0.000	22.39	2.98	23.06	2.882
24.050	0.000	21.91	2.96	22.92	2.859
24.337	0.000	0.00	2.51	21.02	2.359
24.625	0.000	0.00	2.13	17.68	1.939
24.913	0.000	0.00	1.77	14.54	1.594
25.200	0.000	0.00	1.47	11.47	1.321
25.488	0.000	0.00	1.23	8.88	1.110
25.775	0.000	0.00	1.05	6.87	0.947
26.063	0.000	0.00	0.91	5.49	0.817
26.350	0.000	0.00	0.78	4.65	0.706
26.638	0.000	0.00	0.68	4.02	0.611
26.925	0.000	0.00	0.59	3.47	0.528
27.213	0.000	0.00	0.51	3.01	0.457
27.500	0.000	0.00	0.44	2.60	0.395
27.788	0.000	0.00	0.38	2.25	0.342
28.075	0.000	0.00	0.33	1.94	0.296
28.363	0.000	0.00	0.28	1.68	0.256
28.650	0.000	0.00	0.25	1.45	0.221
28.938	0.000	0.00	0.21	1.26	0.191
29.225	0.000	0.00	0.18	1.09	0.165
29.513	0.000	0.00	0.16	0.94	0.143
29.800	0.000	0.00	0.14	0.81	0.124
30.088	0.000	0.00	0.12	0.70	0.107
30.375	0.000	0.00	0.10	0.61	0.093
30.663	0.000	0.00	0.09	0.53	0.080
30.950	0.000	0.00	0.08	0.46	0.069
31.238	0.000	0.00	0.07	0.39	0.060
31.525	0.000	0.00	0.06	0.34	0.052
31.813	0.000	0.00	0.05	0.29	0.045
32.100	0.000	0.00	0.04	0.25	0.039
32.388	0.000	0.00	0.04	0.22	0.033
32.675	0.000	0.00	0.03	0.19	0.029
32.963	0.000	0.00	0.03	0.16	0.025
33.250	0.000	0.00	0.02	0.14	0.022
33.538	0.000	0.00	0.02	0.12	0.019
33.825	0.000	0.00	0.02	0.11	0.016
34.112	0.000	0.00	0.02	0.09	0.014
34.400	0.000	0.00	0.01	0.08	0.012
34.687	0.000	0.00	0.01	0.07	0.010
34.975	0.000	0.00	0.01	0.06	0.009
35.262	0.000	0.00	0.01	0.05	0.008
35.550	0.000	0.00	0.01	0.04	0.007
35.837	0.000	0.00	0.01	0.04	0.006
36.125	0.000	0.00	0.01	0.03	0.005
36.412	0.000	0.00	0.00	0.03	0.004

36.700	0.000	0.00	0.00	0.02	0.004
36.987	0.000	0.00	0.00	0.02	0.003
37.275	0.000	0.00	0.00	0.02	0.003
37.562	0.000	0.00	0.00	0.02	0.002
37.850	0.000	0.00	0.00	0.01	0.002
38.137	0.000	0.00	0.00	0.01	0.002
38.425	0.000	0.00	0.00	0.01	0.002
38.712	0.000	0.00	0.00	0.01	0.001
39.000	0.000	0.00	0.00	0.01	0.001
39.287	0.000	0.00	0.00	0.01	0.001

SECTION 6
REFERENCES

- **AS-BUILTS STORM DRAIN IMPROVEMENT PLANS FOR PARCEL MAP NO. 10141**

SAFCO PRODUCTS • NEW HOPE, MINNESOTA
REORDER BY PART NUMBER 6552
POSITION EDGE OF PRINT ON THIS LINE



S.D. CONSTRUCTION NOTES:

1. CONST. " R.C.P. STORM DRAIN.
2. CONST. 42" R.C.P. STORM DRAIN.
3. CONST. 24" R.C.P. STORM DRAIN.
6. CONST. 36" R.C.P. STORM DRAIN.
9. CONST. 84" R.C.P. STORM DRAIN.
10. CONST. TRANSITION STRUCTURE NO. 1 PER DETAIL ON SHEET 2
14. CONST. S.D. CLEANOUT PER DETAIL ON SHEET 2
15. CONST. SPECIAL MANHOLE SHAFT WITH SAFETY LEDGE PER DETAIL ON SHEET 2
21. CONST. TYPE "A" CATCH BASIN PER S.B.C.R.D. STD. 206.
22. CONST. LOCAL DEPRESSION PER S.B.C.R.D. STD. 203.
19. CONST. TYPE "A" CATCH BASIN (MODIFIED) W/ GRATE INLET PER DETAIL ON SHEET 3
20. CONST. PIPE INLET TYPE OCPI WITH STEEL COVER PER DETAIL ON SHEET 3

S.D. CURVE DATA

	Δ	R	L	T
A	00°31'28"	994.00'	9.07'	4.54'
B	90°31'28"	45.00'	71.10'	45.41'
C	44°48'27"	90.00'	70.38'	37.10'
D	89°22'53"	45.00'	70.20'	44.52'
E	75°00'00"	45.00'	58.91'	34.53'
F	28°35'40"	45.00'	22.50'	11.49'

	Δ	R	L	T
G	25°00'00"	45.00'	35.34'	18.04'
H	42°12'40"	45.00'	33.15'	17.37'

NO	DATE	REVISIONS	APP
1	12/16/86	REVISE PER LAND MANAGEMENT DEPT. CHECKPRINT	
2	12/16/86	REVISE "D" LOAD ON LAT. "K-K" (FROM 1850 D TO 1400 D)	

REGISTERED PROFESSIONAL ENGINEER JAMES MILTON MADOLE No. 14814 Exp. 3/31/88 CIVIL STATE OF CALIFORNIA

PREPARED IN THE OFFICE OF
MADOLE & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERING
1820 E. 16th STREET
SANTA ANA, CA. 92701
PHONE 714 · 835 - 2548
J. M. MADOLE R.C.E. 14814 — DATE 10-2-86

FIELD BOOK REFERENCE

NO.	REVISION	BY	DATE

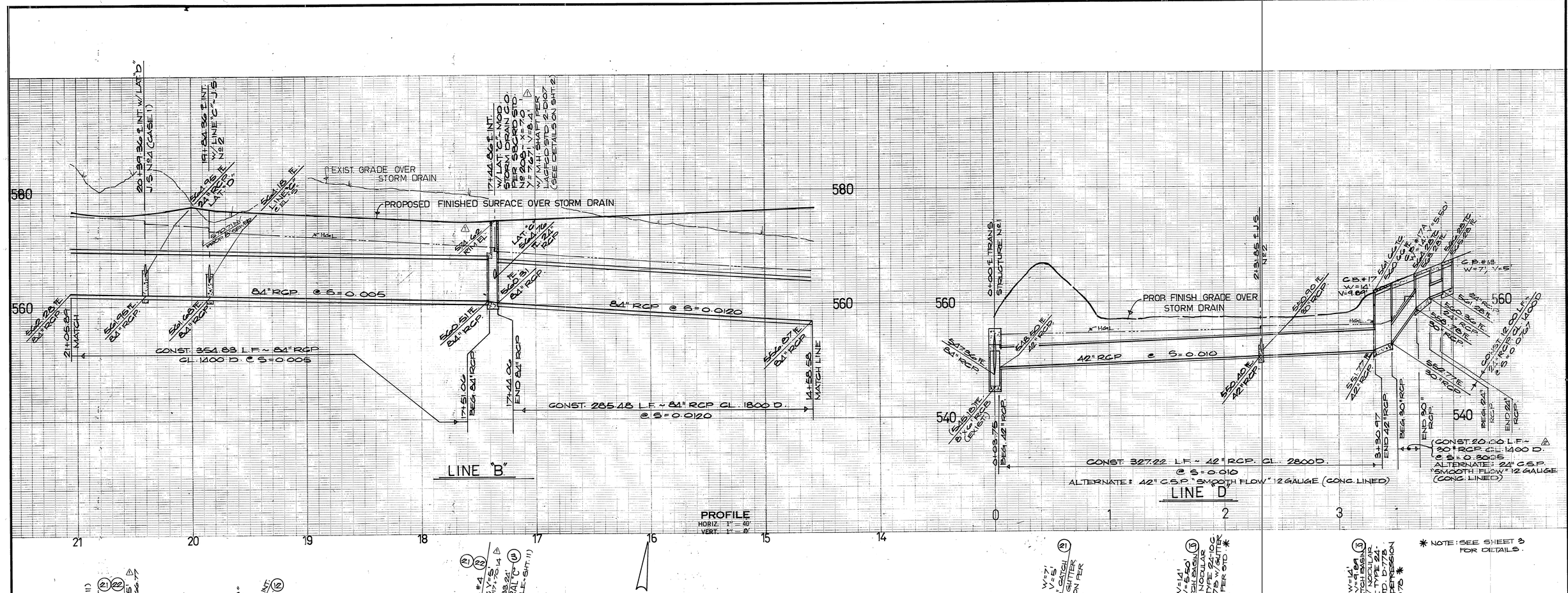
COUNTY OF SAN BERNARDINO
ROAD DEPARTMENT

DRAWN BY: SL
DESIGNED BY: RM, SL
CHECKED BY: RM
RECOMMENDED BY
APPROVED BY: 12-1-86
ASS'T. ROAD COMM. ENGR. — DATE
COUNTY ENGINEER — DATE

IMPROVEMENT PLANS FOR
PARCEL MAP NO. 10141
STORM DRAIN PLAN
LINE "B" & LINE "D"

W. O. NO.
ROAD NO.
FILE NO.
SHEET 4 OF 11

J. N. 420-936
CHS 23



S.D. CONSTRUCTION NOTES:

- (5) — CONST. 30" R.C.P. STORM DRAIN.
- (3) (2) — CONST. 21" R.C.P. STORM DRAIN.
- (4) — CONST. 24" R.C.P. STORM DRAIN.
- (9) — CONST. 27" R.C.P. STORM DRAIN.
- (12) — CONST. 84" R.C.P. STORM DRAIN.
- (13) (12) — CONST. JUNCTION STRUCTURE NO. 2 PER DETAIL ON SHEET 2
- (14) — CONST. JUNCTION STRUCTURE NO. 4 (CASE I) PER DETAIL ON SHEET 2
- (19) — CONST. S.D. CLEANOUT PER DETAIL ON SHEET 2.
- (20) — CONST. TYPE "A" CATCH BASIN (MOD) W GRATE INLET PER DETAIL ON SHEET 3.
- (21) — CONST. PIPE INLET TYPE OCP1 WITH STEEL COVER PER DETAIL ON SHEET 3
- (22) — CONST. TYPE "A" CATCH BASIN PER S.B.C.R.D. STD. 206.
- CONST. LOCAL DEPRESSION PER S.B.C.R.D. STD. 203.

NO	DATE	REVISIONS	APP
1	12/16/86	ADD ST. STATION ON ℄ C.B.#5. ADD "V" & RIM EL. FOR S.D. CLEANOUT	JRR
2	12/16/86	REVISE "D" LOAD ON LINE "D" FROM 1800 D TO 1400 D.	JRR

REGISTERED PROFESSIONAL ENGINEER JAMES WILTON MADOLE No. 14814 Exp. 3/31/89 CIVIL STATE OF CALIFORNIA

PREPARED IN THE OFFICE OF
MADOLE & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERING
1820 E. 16th STREET
SANTA ANA, CA. 92701
PHONE 714 · 835-2548

J. M. MADOLE R.C.E. 14814 — DATE 10-2-86

FIELD BOOK REFERENCE

NO.	REVISION	BY	DATE

COUNTY OF SAN BERNARDINO
ROAD DEPARTMENT

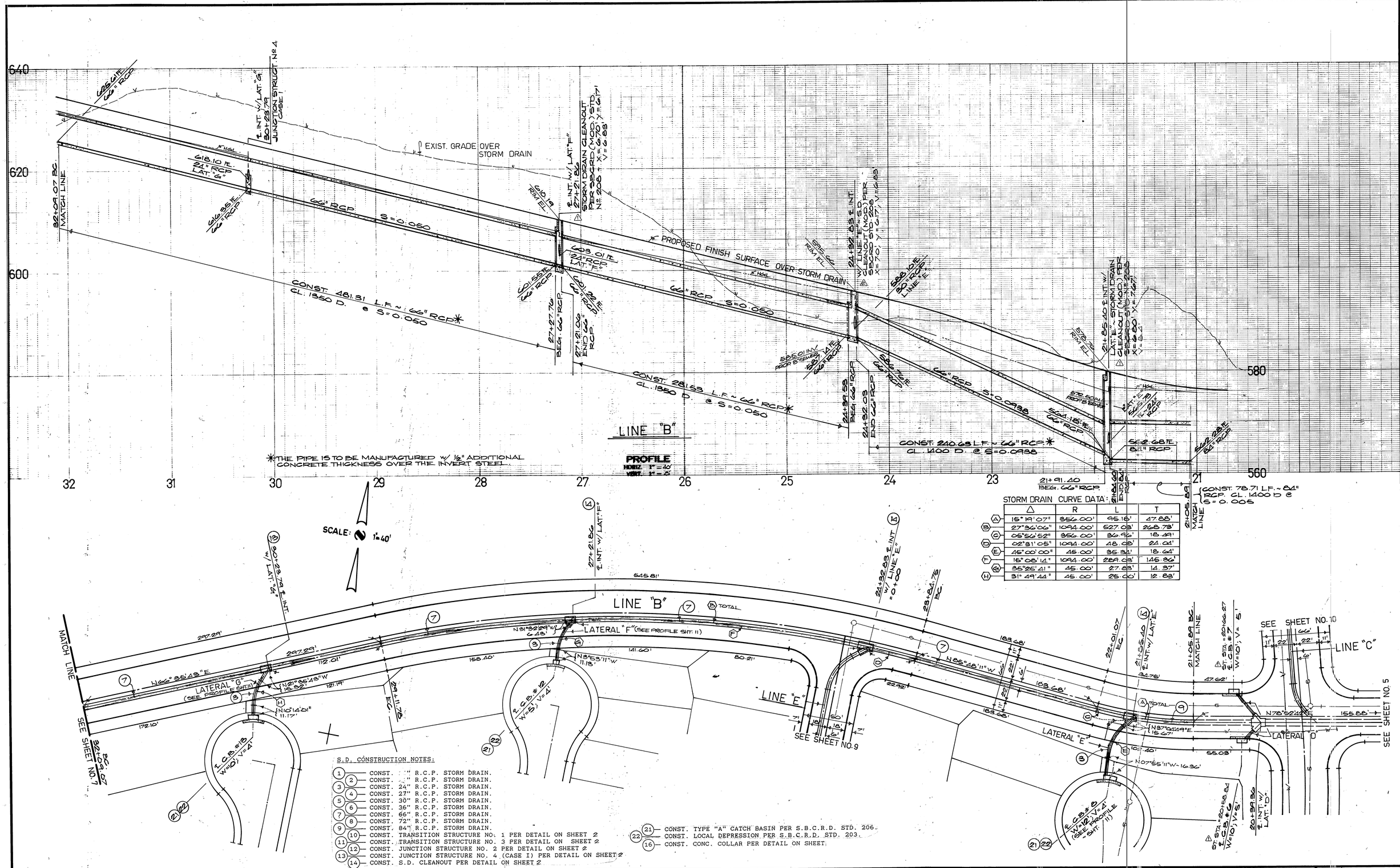
DRAWN BY: SL
DESIGNED BY: RM, SL
CHECKED BY: RM
RECOMMENDED BY
ASS'T. ROAD COMM. ENGR. — DATE
COUNTY ENGINEER — DATE
APPROVED BY: 12-1-86

IMPROVEMENT PLANS FOR
PARCEL MAP NO. 10141
STORM DRAIN PLAN
LINE "B" & LINE "D"

W. O. NO.
ROAD NO.
FILE NO.
SHEET 5 OF 11

J. N. 420-985
CH-5 23

SAFCO PRODUCTS • NEW HOPE, MINNESOTA REORDER BY PART NUMBER 65052 POSITION EDGE OF FRONT ON THIS LINE



STORM DRAIN CURVE DATA:

	Δ	R	L	T
A	15° 19' 07"	356.00'	95.16'	47.88'
B	27° 36' 06"	1094.00'	527.08'	268.78'
C	05° 56' 52"	356.00'	36.96'	18.49'
D	02° 31' 05"	1094.00'	48.08'	24.04'
E	46° 00' 00"	45.00'	36.31'	18.64'
F	15° 06' 14"	1094.00'	289.08'	145.36'
G	35° 25' 41"	45.00'	27.83'	14.37'
H	31° 49' 44"	45.00'	25.00'	12.88'

S.D. CONSTRUCTION NOTES:

1. CONST. " " R.C.P. STORM DRAIN.
2. CONST. " " R.C.P. STORM DRAIN.
3. CONST. 24" R.C.P. STORM DRAIN.
4. CONST. 27" R.C.P. STORM DRAIN.
5. CONST. 30" R.C.P. STORM DRAIN.
6. CONST. 36" R.C.P. STORM DRAIN.
7. CONST. 66" R.C.P. STORM DRAIN.
8. CONST. 72" R.C.P. STORM DRAIN.
9. CONST. 84" R.C.P. STORM DRAIN.
10. CONST. TRANSITION STRUCTURE NO. 1 PER DETAIL ON SHEET 2
11. CONST. TRANSITION STRUCTURE NO. 3 PER DETAIL ON SHEET 2
12. CONST. JUNCTION STRUCTURE NO. 2 PER DETAIL ON SHEET 2
13. CONST. JUNCTION STRUCTURE NO. 4 (CASE I) PER DETAIL ON SHEET 2
14. CONST. S.D. CLEANOUT PER DETAIL ON SHEET 2
21. CONST. TYPE "A" CATCH BASIN PER S.B.C.R.D. STD. 206.
22. CONST. LOCAL DEPRESSION PER S.B.C.R.D. STD. 203.
16. CONST. CONC. COLLAR PER DETAIL ON SHEET

NO	DATE	REVISIONS	APP
1	12/16/86	ADD "V" & RIM EL. FOR S.D. CLEANOUT PER LAND MANAGEMENT DEPT.	JMR
		CHECK PRINT. ADD STATIONS ON ℄ C.B.'S.	
2	12/16/86	CHANGE TRANS. STRUCT. TO S.D. CLEANOUT ON STA. 24+32.83	JMR

REGISTERED PROFESSIONAL ENGINEER JAMES MILTON MADOLE No. 14814 Exp. 3/31/89 CIVIL STATE OF CALIFORNIA

PREPARED IN THE OFFICE OF
MADOLE & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERING
1820 E. 16th STREET
SANTA ANA, CA. 92701
PHONE 714 - 835 - 2548
J. M. MADOLE R.C.E. 14814

10-2-86 DATE

FIELD BOOK REFERENCE

NO.	REVISION	BY	DATE

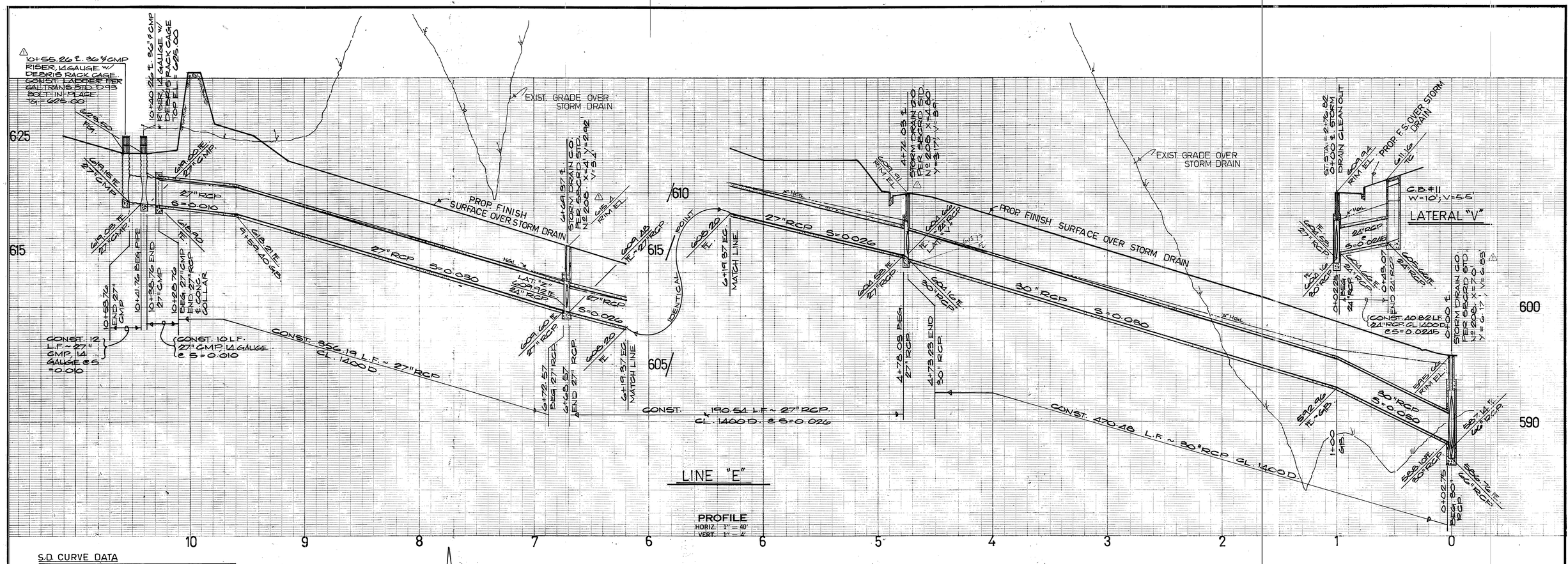
COUNTY OF SAN BERNARDINO
ROAD DEPARTMENT

DRAWN BY: SL
DESIGNED BY: RM, SL
CHECKED BY: RM
RECOMMENDED BY
ASST. ROAD COMM. ENGR. DATE
COUNTY ENGINEER DATE
APPROVED BY: 12.1.86

IMPROVEMENT PLANS FOR
PARCEL MAP NO. 10141
STORM DRAIN PLAN
LINE "B"

W. O. NO.
ROAD NO.
FILE NO.
SHEET 6 OF 11

J. N. 420-936
CHS 23



NO	DATE	REVISIONS	APP
1	12/17/86	ADD LADDER TO RISER (36"ϕ CMP); ADD "V" VALUE & RIM EL. ON S.D. CLEANOUTS, ADD ST. STA. TO ℄ C.B. PER LAND MGT. DEPT. CHECKPRINT	
		ADD ST. STA. TO ℄ S.D. CLEANOUT	

REGISTERED PROFESSIONAL ENGINEER JAMES MILTON MADOLE No. 14814 Exp. 2/31/89 CIVIL STATE OF CALIFORNIA

PREPARED IN THE OFFICE OF
MADOLE & ASSOCIATES, INC.
CONSULTING CIVIL ENGINEERING
1820 E. 16th STREET
SANTA ANA, CA. 92701
PHONE 714 - 835 - 2348

J. M. Madole 10-2-86
J. M. MADOLE R.C.E. 14814 DATE

FIELD BOOK REFERENCE

NO.	REVISION	BY	DATE

COUNTY OF SAN BERNARDINO
ROAD DEPARTMENT

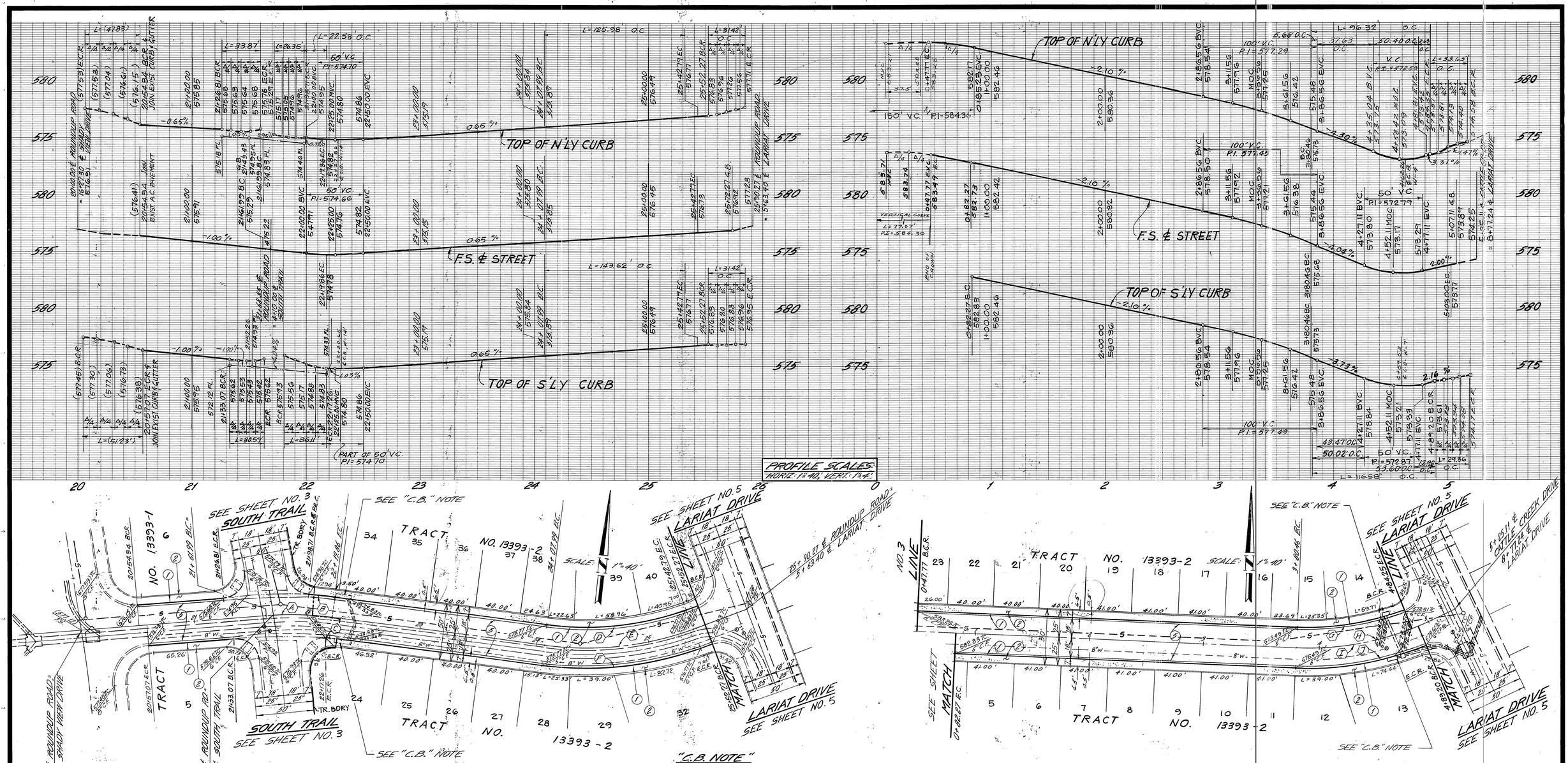
DRAWN BY: SL
DESIGNED BY: RM, SL
CHECKED BY: RM
RECOMMENDED BY

APPROVED BY: 12.1.86
ASS'T. ROAD COMM. ENGR. DATE
COUNTY ENGINEER DATE

IMPROVEMENT PLANS FOR
PARCEL MAP NO. 10141
STORM DRAIN PLAN
LINE "E"

W. O. NO.
ROAD NO.
FILE NO.
SHEET 9 OF 11

J. N. 420-986
CHS 23



"C.B. NOTE"
EXIST. C.B. + LOCAL DEPRESSION PER MADDLE + ASSOC. PLANS. CONTRACTOR TO VERIFY LOCATION AND ELEVATION PRIOR TO STARTING CONSTRUCTION.

CURVE DATA

	Δ	R	L	T		Δ	R	L	T
A	12°03'22"	275.00'	57.87'	29.04'	G	23°47'15"	232.00'	96.32'	48.86'
B	4°24'21"	293.00'	22.53'	11.27'	H	23°47'15"	250.00'	103.79'	52.65'
C	0°32'26"	257.00'	2.43'	1.21'	I	24°55'22"	250.00'	108.75'	55.25'
D	28°05'06"	257.00'	125.98'	64.29'	J	24°55'22"	268.00'	116.58'	59.23'
E	28°05'06"	275.00'	134.80'	68.78'					
F	28°05'06"	293.00'	143.62'	73.28'					

CONSTRUCTION NOTES:

1. CONST. CONC. CURB & GUTTER PER STD. DWG. 116
2. CONST. CONC. SIDEWALK PER STD. DWG. 109
3. CONST. A.C. OVER

REGISTERED PROFESSIONAL ENGINEER ROBERT IMSANDE NO. 25609 12/31/89 CIVIL STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER NO. 25609 12/31/89 CIVIL STATE OF CALIFORNIA

PREPARED IN THE OFFICE OF
Hall & Foreman, Inc.
3170 REDHILL AVENUE COSTA MESA, CA 92626-3428
CIVIL ENGINEERING • LAND PLANNING • LAND SURVEYING
Robert C. Imsande 12/8/86
ROBERT C. IMSANDE, R.C.E. 25609 DATE

FIELD BOOK REFERENCE			
NO.	REVISION	BY	DATE

COUNTY OF SAN BERNARDINO
ROAD DEPARTMENT

DRAWN BY:
DESIGNED BY:
CHECKED BY:
RECOMMENDED BY
ASS'T. ROAD COMM. ENGR. DATE
COUNTY ENGINEER DATE
APPROVED BY: 6-1-87

IMPROVEMENT PLANS FOR
TRACT NO. 13393-2
ROUNDUP ROAD & CATTLE CREEK DRIVE

W. O. NO.
ROAD NO.
FILE NO.
SHEET 2 OF 6

CHS83 J.N. 3712

- **CALTRANS STORM DRAIN PLANS FOR CHINO VALLEY FREEWAY 71**

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
08	SBd,Riv	71	5.3/8.5, 0.0/0.2	112	397

REGISTERED CIVIL ENGINEER

2-5-96
PLANS APPROVAL DATE

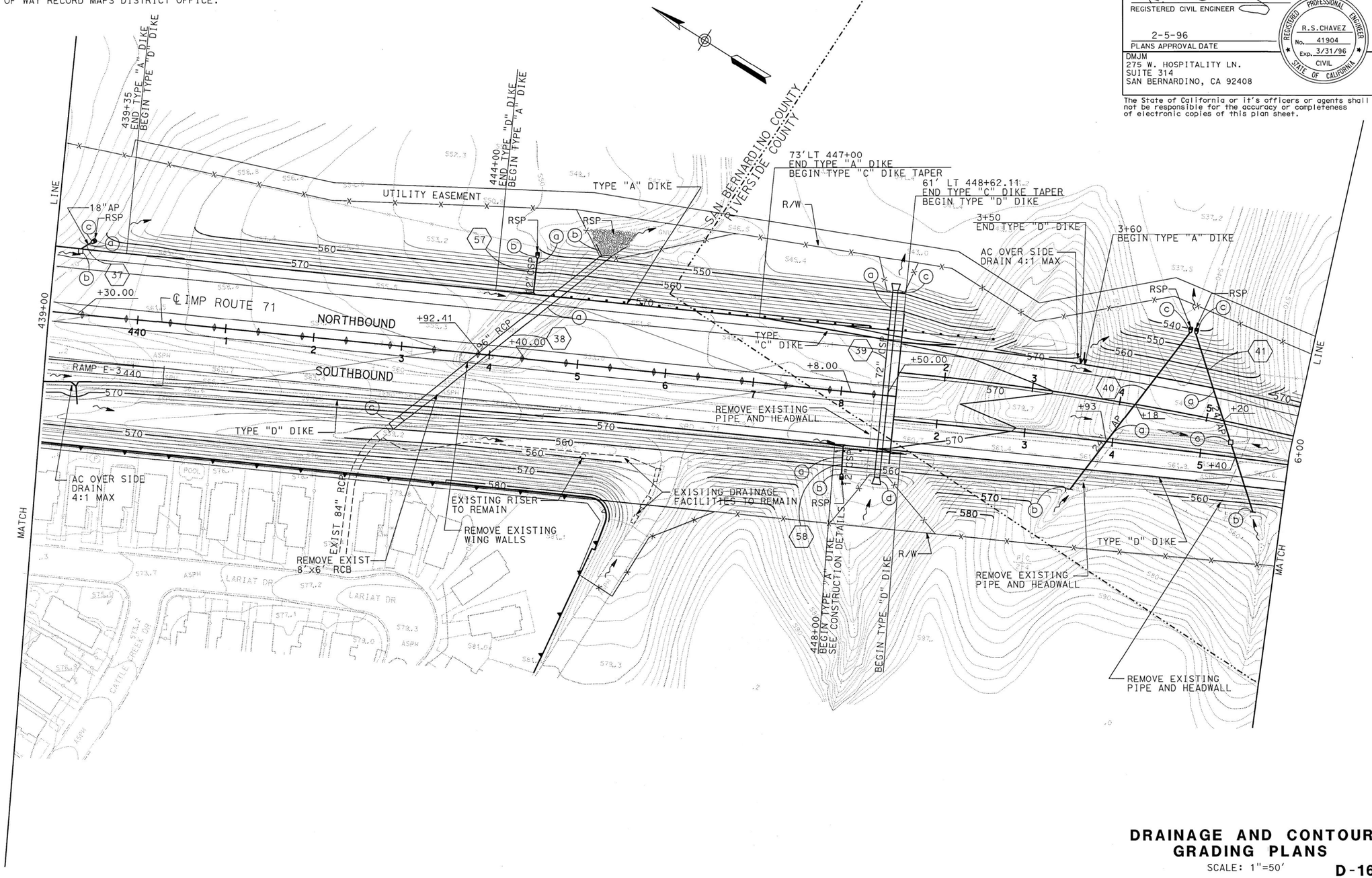
REGISTERED PROFESSIONAL ENGINEER R.S.CHAVEZ No. 41904 Exp. 3/31/96 CIVIL STATE OF CALIFORNIA

DMJM
275 W. HOSPITALITY LN.
SUITE 314
SAN BERNARDINO, CA 92408

The State of California or it's officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

NOTE:

FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS DISTRICT OFFICE.



DRAINAGE AND CONTOUR GRADING PLANS

SCALE: 1"=50'

D-16

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION	DESIGN OVERSIGHT	CALCULATED/DESIGNED BY	ADF
Caltrans PROJECT DEVELOPMENT	J.F. HERNANDEZ	CHECKED BY	KLS

RSC	CS	KS	KS
3/10/94	10/5/94	4/23/95	7/5/95

DATE	REVISED BY	DATE REVISED

FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES 0 1 2 3

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DGN FILE => 844640i16.dgn

DATE PLOTTED => 17-JUL-2008
TIME PLOTTED => 14:47

CU 08232 | EA 446401

FORM DC-OE-92-PF (REV. 3/88)

NOT AS-BUILT

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
08	SBd,Riv	71	5.3/8.5, 0.0/0.2	113	397

R. S. Chavez
REGISTERED CIVIL ENGINEER

2-5-96
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
R.S.CHAVEZ
No. 41904
Exp. 3/31/96
CIVIL
STATE OF CALIFORNIA

DMJM
275 W. HOSPITALITY LN.
SUITE 314
SAN BERNARDINO, CA 92408

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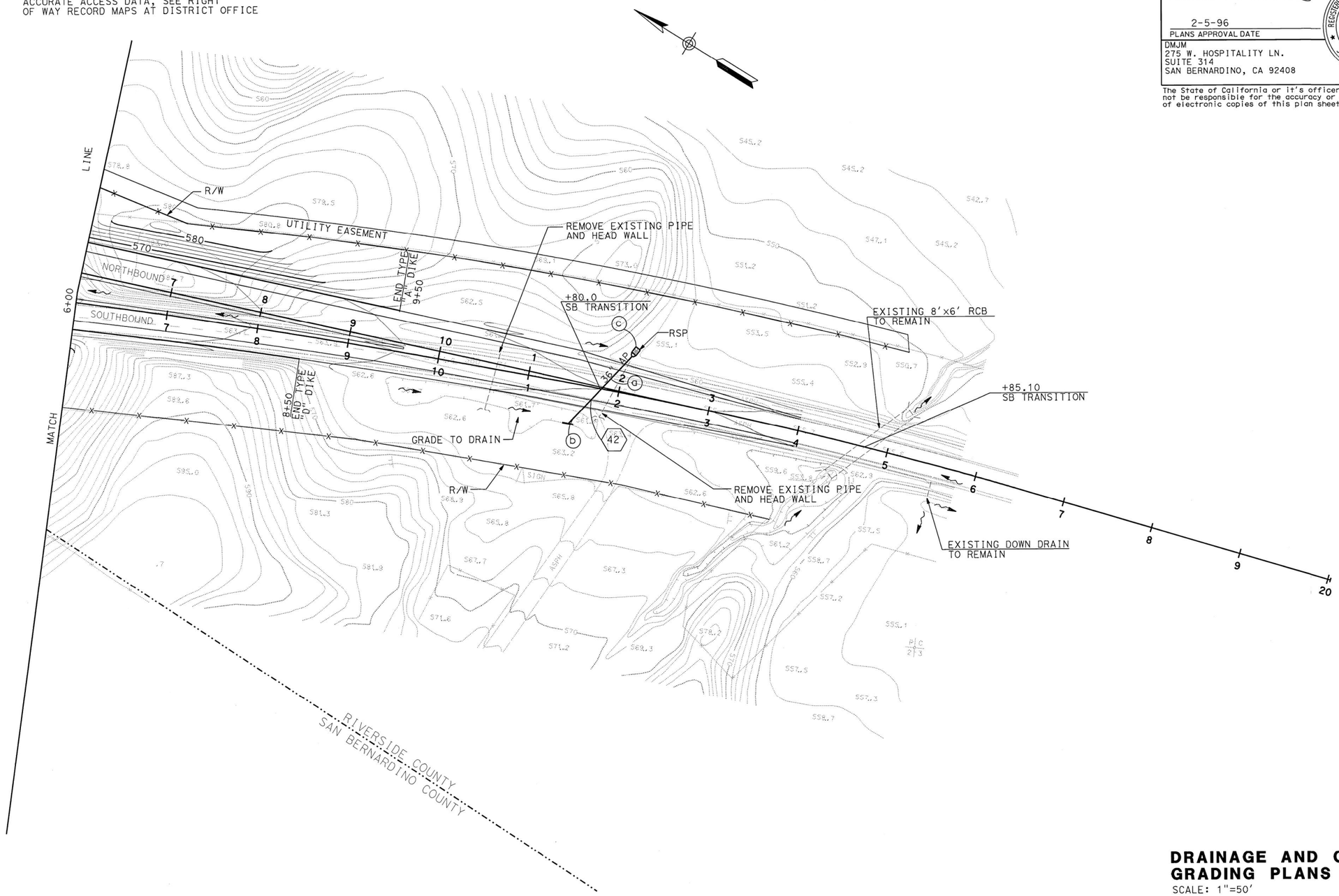
NOTE:

FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE



STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans PROJECT DEVELOPMENT

DESIGN OVERSIGHT
J.F. HERNANDEZ

	DATE	REVISED BY	RSC	CS	KS
CALCULATED/DESIGNED BY	ADF	DATE REVISED	3/10/94	10/5/94	11/5/95
CHECKED BY	KLS				

DRAINAGE AND CONTOUR GRADING PLANS

SCALE: 1"=50'

D-17

FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES 0 1 2 3

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DGN FILE => 844640i17.dgn

DATE PLOTTED => 17-JUL-2008
TIME PLOTTED => 14:47

CU 08232 | EA 446401

NOT AS-BUILT

FORM DC-OE-92-PF (REV. 3/88)

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
08	Sbd,Riv	71	5.3/8.5, 0.0/0.2'	122	397

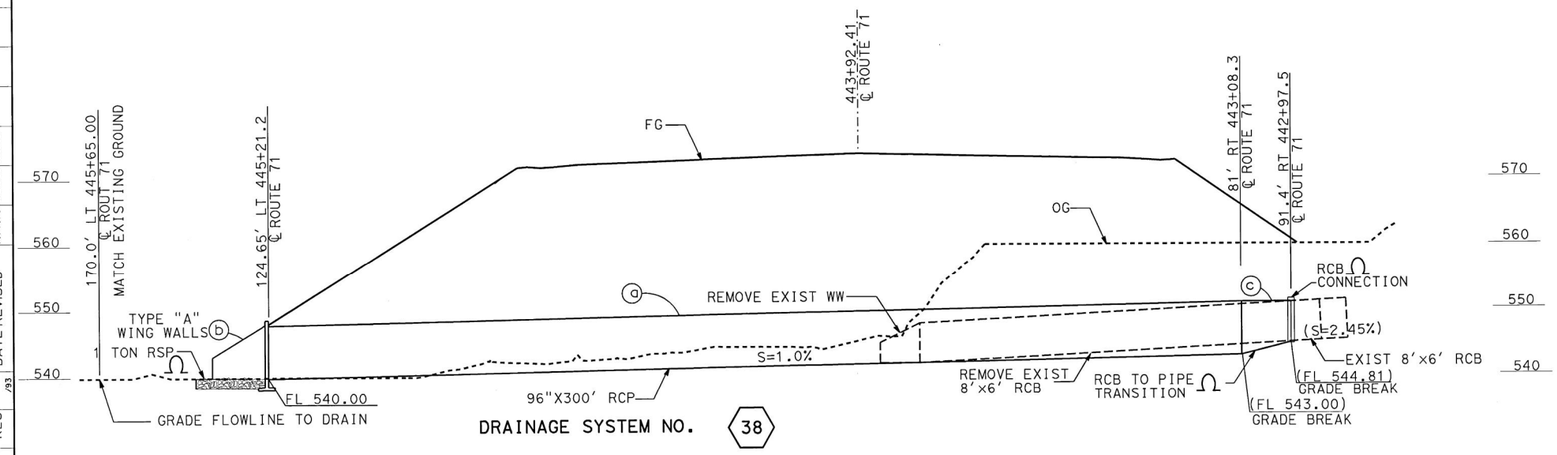
R. S. C.
REGISTERED CIVIL ENGINEER

2-5-96
PLANS APPROVAL DATE

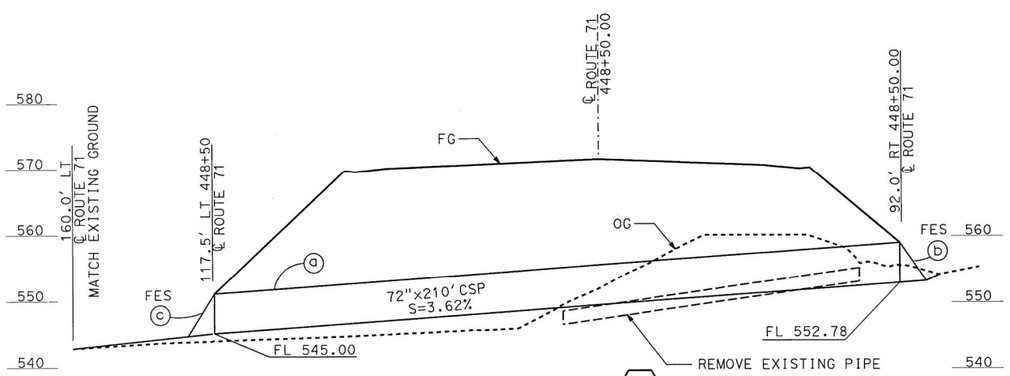
REGISTERED PROFESSIONAL ENGINEER R.S.CHAVEZ No. 41904 Exp. 3/31/96 CIVIL STATE OF CALIFORNIA

DMJM
275 W. HOSPITALITY LN.
SUITE 314
SAN BERNARDINO, CA 92408

The State of California or it's officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.



DRAINAGE SYSTEM NO. 38



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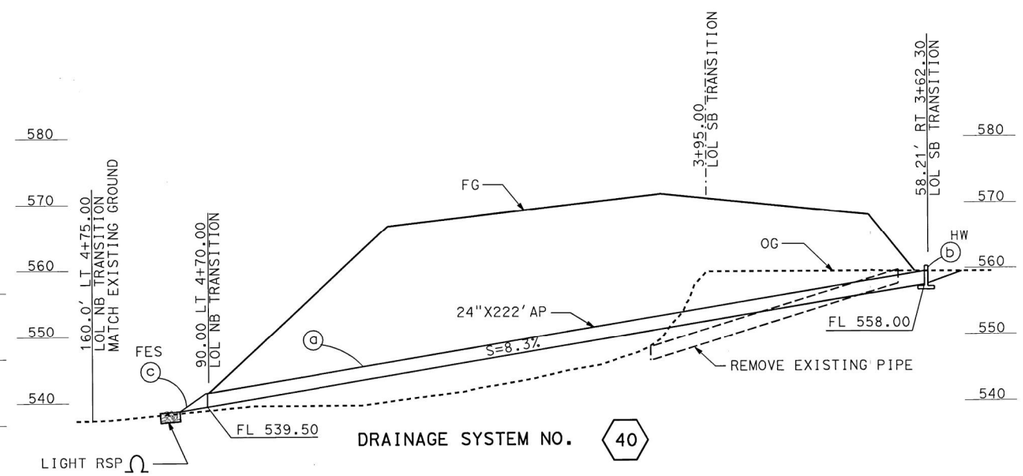

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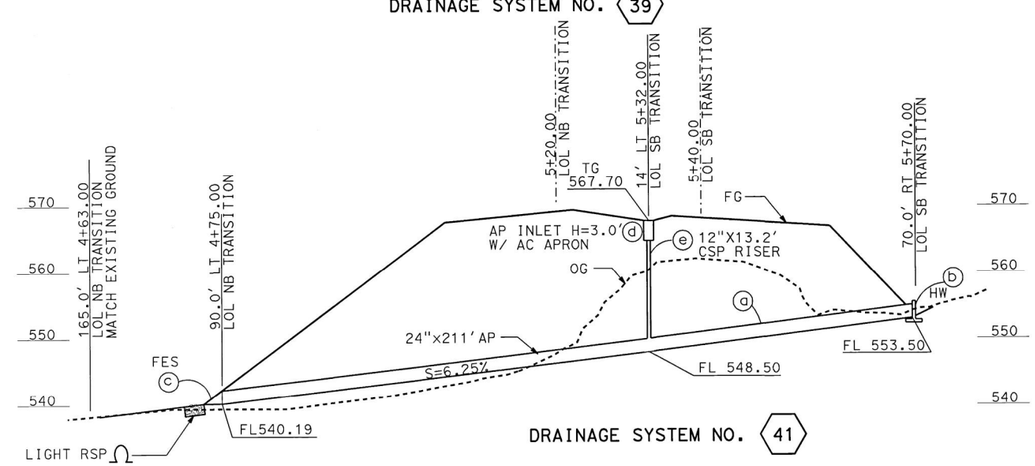
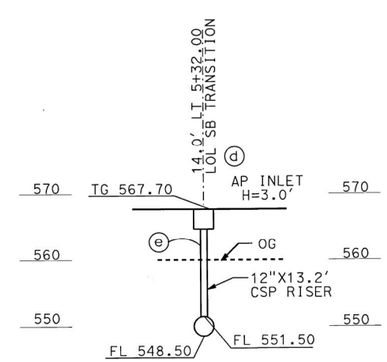


DRAINAGE SYSTEM NO. 41



SCALE: HORIZ 1"=10'
VERT 1"=10'

38 39 40 41

DRAINAGE PROFILE

SCALE: HORIZ 1"=20'
VERT 1"=10'

D-26

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans PROJECT DEVELOPMENT

DESIGN OVERSIGHT J.F. HERNANDEZ

CALCULATED/DESIGNED BY	ADF	DATE /93	REVISED BY	CS	KS
CHECKED BY	KLS	/93	DATE REVISED	10/15/94	7/5/95

FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES 0 1 2 3

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DGN FILE => 844640i26.dgn

DATE PLOTTED => 17-JUL-2008
TIME PLOTTED => 14:48

CU 08232 | EA 446401

FORM DC-OE-91-PF (REV. 3/88)

NOT AS-BUILT

DIST	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
08	Sbd,Riv	71	5.3/8.5, 0.0/0.2'	124	397

REGISTERED CIVIL ENGINEER

2-5-96
PLANS APPROVAL DATE

DMJM
275 W. HOSPITALITY LN.
SUITE 314
SAN BERNARDINO, CA 92408

REGISTERED PROFESSIONAL ENGINEER R.S.CHAVEZ No. 41904 Exp. 3/31/96 CIVIL STATE OF CALIFORNIA

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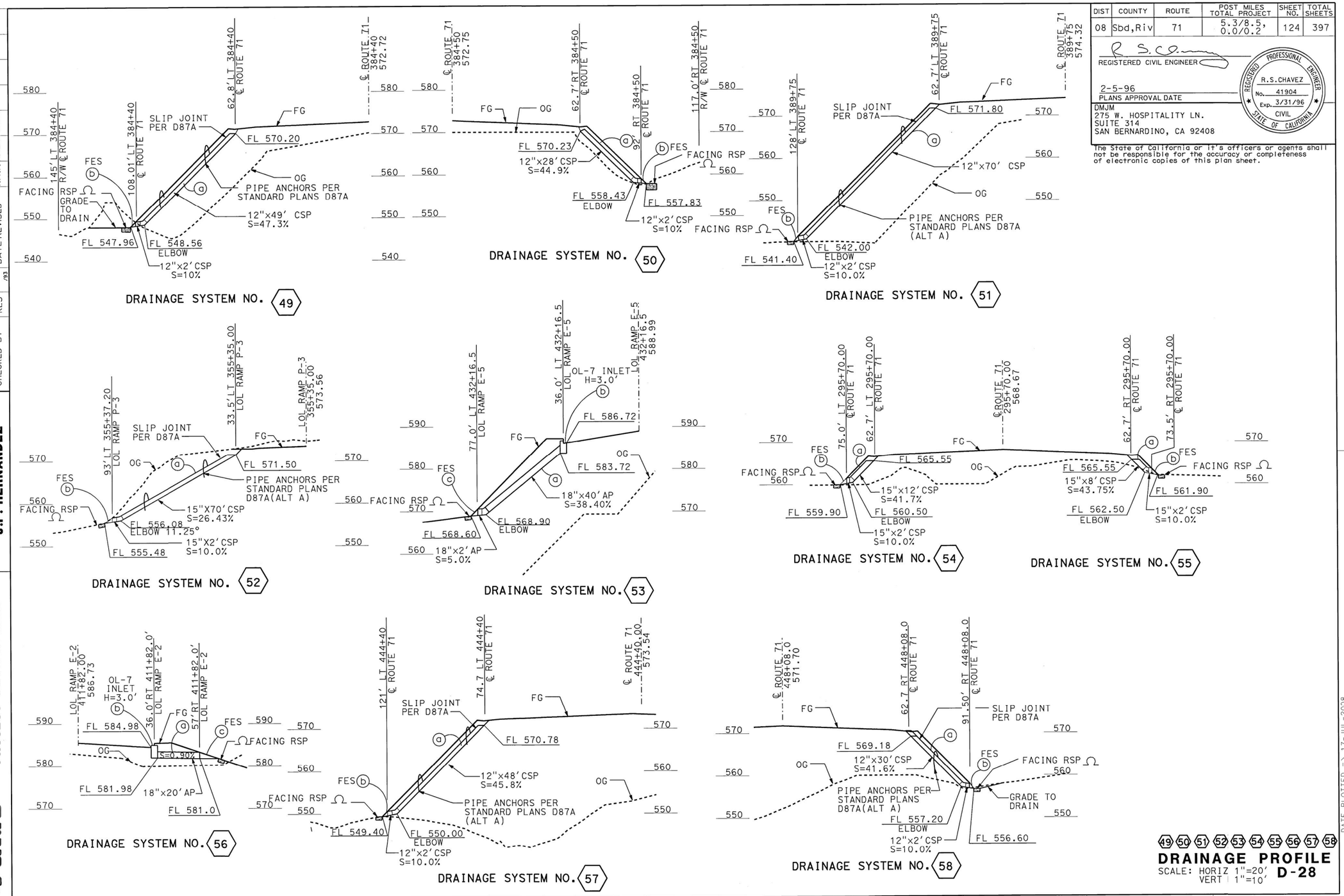

49 50 51 52 53 54 55 56 57 58

DRAINAGE PROFILE

SCALE: HORIZ 1"=20' VERT 1"=10'

D-28

DATE PLOTTED => 17-JUL-2008
TIME PLOTTED => 14:48

CS	KS	10/15/94	KS	7/5/95
REVISED BY	DATE	DATE REVISED		
ADF	KLS			
CALCULATED/ DESIGNED BY	DATE			
CHECKED BY				

DESIGN OVERSIGHT **J.F. HERNANDEZ**

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans **PROJECT DEVELOPMENT**

FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES 0 1 2 3

USERNAME => jhartog
DGN FILE => 844640i28.dgn

CU 08232 | EA 446401

FORM DC-OE-91-PF (REV. 3/88)

NOT AS-BUILT

November 2019

HYDROLOGY ANALYSIS

For

Tentative Tract 20317

City of Chino Hills

County of San Bernardino

HUNSAKER & ASSOCIATES IRVINE, INC.

HYDROLOGY ANALYSIS

Tentative Tract 20317

City of Chino Hills | County of San Bernardino

HUNSAKER & ASSOCIATES IRVINE, INC.

November 2019