Second Submittal

Preliminary Drainage Report

DRNSTY-2023-00002

Pepper 210 Commerce Center
Rialto, California

Project # _____

Prepared by:

Kimley-Horn and Associates, INC.

Joshua Bielik, Engineer
(619) 272-7118
joshua.bielik@kimley-horn.com
401 B Street, Suite 600
San Diego, CA 92101

Prepared for:

Carson BBC Logistics Center, LLC.

Daniel Darnell, Vice President
(949) 922-2509
ddarnell@carsoncompanies.com
100 Bayview Circle, Suite 3500
Newport Beach, CA 92660

PEPPER 210 COMMERCE CENTER

Preliminary Drainage Report

Project # _____

NOVEMBER 2023 | VERSION 2

Prepared By:

Kimley»Horn

This Drainage Report has been prepared by Kimley-Horn and Associates, Inc. under the direct supervision of the following Registered Civil engineer. The undersigned attests to the technical data contained in this study, and to the qualifications of technical specialists providing engineering computations upon which the recommendations and conclusions are based.

_____	_____
Registered Civil Engineer	Date

Table of Contents

1 Introduction 1-1

1.1 Project Description and Purpose 1-1

2 Project Setting 2–1

2.1 Topography 2–1

2.2 Precipitation 2–1

2.3 Watershed Description 2–1

2.4 Soil Types 2–1

2.5 Land Use 2–1

2.6 Groundwater 2–2

2.7 FEMA Mapping 2–2

3 Site Conditions 3-1

3.1 Existing Site Conditions 3-1

3.2 Proposed Site Conditions 3-1

4 Hydrologic Analysis 4-1

4.1 Methodology 4-1

4.1.1 Geometry 4-1

4.1.2 Intensity and Time of Concentration 4-1

4.1.3 Curve Numbers and Loss Rates 4-1

4.2 Hydrologic Results 4-2

5 Water Quality and Low Impact Development Requirements 5-1

5.1 Stormwater Treatment 5-1

5.2 Stormwater Improvements 5-1

5.3 Stormwater Maintenance 5-1

6 Hydraulics Analysis 6-1

6.1 Methodology 6-1

6.1.1 Infiltration Basin Standards 6-1

6.1.2 Storm Drain Design 6-1

6.2 Hydraulic Analysis 6-1

6.2.1 Storm Drain Pipe Calculations 6-1

6.3 Infiltration Basin Analysis 6-2
7 Conclusion 7-4
7.1 Interoffice Memo (September 4, 1987) Standards 7-4

Figures

Figure 1–1 Project Location Map 1-1

Tables

Table 4-1: Existing Conditions Hydrology Results 4-2
Table 4-2: Onsite Proposed Conditions Hydrology Results: 4-3
Table 6-1: Drainage Basin Summary 6-2
Table 6-2: BMP Summary 6-3
Table 7-1: Results Per September 4, 1987 Interoffice Memo 7-4

Appendices

Appendix A NOAA Atlas 14 Precipitation Estimates

Appendix B FEMA FIRMette

Appendix C Drainage Exhibits

Appendix D 25-Year Existing Conditions Hydrology AES Rational Method Results

Appendix E 100-Year Proposed Conditions Hydrology AES Rational Method Results

Appendix F Hydrograph Data for All Onsite Basins

Appendix G Hydrology Manual Excerpts

Appendix H Hydrology Manual Memo

Appendix I Infiltration Testing Results

Appendix J Existing Flood Control Culvert Capacity Calculations

1 INTRODUCTION

1.1 PROJECT DESCRIPTION AND PURPOSE

This Drainage Report is provided in support of the proposed Pepper 210 Commerce Center Industrial Center in Rialto, California. The 101.31 acre site is north of I-210 and E Highland Ave and southwest of the Lytle Creek Wash. See Figure 1-1 below for a project location map. The existing site is a mining and quarry pit, and the proposed project site will be revised for light industrial use. The proposed site development will include an industrial building, loading docks, parking and drive isles for auto and truck traffic, and landscaping. This drainage report includes the existing and proposed conditions hydrologic analyses, onsite infiltration basin analysis, and entitlement design of the onsite drainage systems.

The project location is shown below in **Figure 1-1**.

Figure 1–1 Project Location Map



2 PROJECT SETTING

2.1 TOPOGRAPHY

The project area is part of a primarily urban watershed that eventually drains to Lytle Creek Channel and to the Santa Ana River. The project site contains significant hills and depressions as it is a mining pit. The onsite watershed slopes gradually from the western side of the site (approximate elevation 1,400) to the southeast corner of the site (approximate elevation 1,282). Overland flows exit the site through an existing culvert at the southeast corner of the site and enter the Lytle Creek Wash. Highland Ave borders on the south and slopes to the east. The Lytle Creek Wash borders on the north and the east and slopes to the south and the east. Existing site topography was created from aerial mapping performed on June 21, 2022 by Aerotech Corporation. The aerial mapping horizontal datum is NAD83 and the vertical datum is GEOID 18.

2.2 PRECIPITATION

Precipitation values for the hydrologic analysis were determined from site specific precipitation frequency estimates published online in the NOAA Atlas 14. For this site (Rialto, California) the The 100-year 24-hour depth equal to 7.04 inches, was used in the flow and volume calculations. **Appendix A** contains the site-specific tabular output from NOAA Atlas 14.

2.3 WATERSHED DESCRIPTION

The project is part of the Santa Ana watershed. Drainage is discharged into the Lytle Creek Wash which travels southwest, eventually connecting to Lytle Creek Channel by way of Lytle Creek Basin. Water then travels into the Santa Ana River before being discharged to the Pacific Ocean, just south of Huntington Beach.

2.4 SOIL TYPES

The type of soil and soil conditions are major factors affecting infiltration and resultant storm water runoff. The Natural Resources Conservation Service (NRCS) has classified soils into four general hydrologic soil groups for comparing infiltration and runoff rates. The groups are based on properties that influence runoff, such as water infiltration rate, texture, natural discharge and moisture condition. The runoff potential is based on the amount of runoff at the end of a long duration storm that occurs after wetting and swelling of the soil not protected by vegetation.

Using the NRCS Web Soil Survey and National Cooperative Soil Survey, this site was identified as Quarries and Pit Soils (GP). The hydrologic classifications of the soil per the NRCS Web Soil Survey are classified as Group A soil. Group A soils typically have high infiltration, low runoff potential, and high rates of water transmission. Group A soils mainly consist of deep, well drained to excessively drained sands or gravelly sands.

2.5 LAND USE

The current site is a quarry and mining pit and is zoned as RC (Resource Conservation). The proposed land use, as defined by the City of San Bernardino, will be zoned as IC (community industrial), which provides sites for light industrial, among other land uses.

2.6 GROUNDWATER

According to Percolation Investigation performed by Tetra Tech BAS Inc., Project No. GEN 19-22E, dated August 11, 2022, groundwater was not encountered, based on borehole depths that ranged from 9.0 to 9.9 feet below ground surface during testing. Groundwater is not expected to be a concern for this project.

2.7 FEMA MAPPING

The project site is covered by Map Number 06071C7940J of the FEMA Flood Insurance Rate Map (FIRM), for San Bernardino County, California, and Incorporated Areas. San Bernardino County Unincorporated Areas, community number 060270, is included in this FIRM. The project site is located within Flood Zone X, which has less than a 0.2% annual chance of flood hazard, and is thus outside of the 500-year floodplain. The project site is southerly adjacent to Zone AE, which has a 1% annual chance flood (100-year flood). The base flood elevations in Zone AE north of the site vary from 1330.6 to 1287.4 feet within Lytle Creek Wash. The proposed surface elevations of the north side of the project site vary from 1357.86 feet to 1298 feet, with a building finished floor elevation of 1333.09 feet. Zone AE is located far enough away from the site to avoid flood risk. The effective FEMA map is dated September 2, 2016 and is provided in **Appendix B.**

3 SITE CONDITIONS

3.1 EXISTING SITE CONDITIONS

The project is located in an existing mining and quarry pit, with steep boundary slopes on the southwest edge of the site that lead into the pit, transitioning into varying sloped terrain. The site overland flows from the west to the east. There is an existing San Bernardino County Flood Control District culvert on the southeast corner of the site that collects drainage, outlets through the existing levee running parallel to the north of the site, and eventually discharges into the Lytle Creek Wash. Calculations showing the capacity and dimensions of this culvert are provided in **Appendix J**. The proposed onsite tributary area is approximately 101.31 acres, which encapsulates the entirety of the site.

Offsite Runoff within Highland Avenue is conveyed east towards the Lytle Creek Wash within the asphalt berm. Highland Avenue also has an existing 48-inch storm drain lateral conveying flows to the south towards the Santa Ana River. Onsite drainage does not flow to this offsite pipe. There are no additional drainage systems in the area or on site. Please refer to the existing conditions hydrology exhibit, included in **Appendix C.**

3.2 PROPOSED SITE CONDITIONS

Stormwater generated by the proposed development will be captured and conveyed to a series of infiltration basins through overland sheetflow as well as underground piping. Stormwater unable to infiltrate in the basins will eventually be discharged to the existing culvert inlet in the southeast corner of the site, which has a maximum capacity of 45 cfs, as shown in **Appendix J**. The proposed infiltration basins will serve as underground storage facilities to detain peak flow rates. A 200’ Flood Control District easement currently exists running parallel with the northern property line of the site, and thus no stormwater improvements will be constructed in this region. For all water quality calculations and documentation refer to the Water Quality Management Plan (WQMP) Report, submitted alongside this report. The WQMP calculations follow the Detention Basin Design Criteria and Hydrology Manual for San Bernardino County. The site hydrologic basins were delineated based on the proposed grading. Refer to the Proposed Drainage Exhibit, included within **Appendix C**.

4 HYDROLOGIC ANALYSIS

4.1 METHODOLOGY

A Modified Rational Method analysis was used to calculate peak flows for the 2-year, 10-year, 25-year, and 100-year storm events under existing and proposed conditions. This method follows the procedure described in Section D of the *San Bernardino County Hydrology Manual* (November 1986). Advanced Engineering Software (AES) was used to estimate times of concentration and peak flow rates with the Modified Rational Method.

The Unit Hydrograph method was also prepared for the 100 year storm event for the purpose of infiltration basin sizing. Methods within Section E of the *San Bernardino County Hydrology Manual* were followed. A hydrograph was prepared using the Civil Design Computer Program (San Bernardino module).

4.1.1 GEOMETRY

Sub-basin boundaries, initial subareas, and flow paths were delineated for each sub-basin with AutoCAD Civil 3D software. These hydrologic parameters are shown for existing conditions and proposed conditions in **Exhibit C-1** and **Exhibit C-2** of **Appendix C**. Point elevations and surfaces within Civil 3D were also used to determine flow path slopes and estimate the shape of routing reaches. A summary of the existing condition and proposed condition inputs and outputs from the AES models are included in **Appendix D and Appendix E, respectively.** The proposed condition sub-basins were each given a sub-basin ID. The sub-basin routing nodes in AES are based on the sub-basin ID plus an increment of 1 as flows are routed downstream. For example, the AES input for the existing condition sub-basin A-1 is an initial sub-area from node 100 to 101 and overland flow from 101 to 102. The flow output from AES for each sub-basin was entered into the hydraulic model which is a conservative approach.

4.1.2 INTENSITY AND TIME OF CONCENTRATION

Rainfall amounts for 5-minute, 10-minute, 15-minute, 30-minute, 60-minute, 2-hour, 3-hour, 6-hour, and 12-hour duration events were taken from NOAA Atlas 14 output and the corresponding intensities are simply calculated as point precipitation over duration. This Intensity-Duration table was then input directly into AES for each storm frequency. AES software was used to calculate the appropriate time of concentration for each sub-basin.

The time of concentration calculated in the AES software was used in the Civil Design software for the unit hydrograph method. The Tc was directly input into the software allowing it to calculate the lag time to use in the analysis of the hydrograph development.

4.1.3 CURVE NUMBERS AND LOSS RATES

AES software was used to calculate loss rates and subsequent runoff coefficients for each sub-basin based on land use type, hydrologic soil group, and Antecedent Moisture Condition (AMC). The existing conditions land utilized for the model was Natural Poor Cover “Barren” to reflect the site’s rough-graded condition. The proposed conditions land use is industrial, which is defined as 90% impervious. Hydrologic soil group A was used for the entire site. The AMC is a commonly used index used to describe how saturated a soil is before the design storm occurs. AMC II, when the watershed is wet but not yet saturated, was used for the existing 25-year analysis, as specific in the Interoffice Memo dated September 4, 1987. AMC III, when the watershed is assumed to already be saturated, was used for the proposed 100-year analysis (as defined

in the San Bernardino County Hydrology Manual). The unit hydrograph method uses the same loss rates as the AES software for the Rational Method.

Per the Interoffice Memo dated September 4, 1987 and referenced in the Hydrology Manual, the hydrology analysis criteria for existing conditions was updated. For 10-year existing peak flow rates the 5-year rainfall values are required to be used, for 25-year peak flow rates the 10-year rainfall values are required to be used, and for 100-year peak flow rates the 25-year rainfall values are required to be used. This produces more conservative values compared to the conventional methodology of utilizing 10-, 25-, and 100-year rainfall values to calculate 10-, 25-, and 100-year peak flow rates, respectively. Additionally, proposed peak flow rates must be mitigated to reduce proposed peak flow rates to 90% of the existing 25-year peak flows.

4.2 HYDROLOGIC RESULTS

The Existing Conditions Drainage Map, **Exhibit C-1** that corresponds to the existing condition rational method can be located in **Appendix C**. Full output from the existing condition hydrology AES models are provided in **Appendix D**. A summary of the existing conditions peak flows is shown in **Table 4-1.**

Table 4-1: Existing Conditions Hydrology Results

Sub-basin ID		Sub-basin Area (ac)	Q_2 (cfs)	Q_{10} (cfs)	Q_{25} (cfs)	Q_{100} (cfs)
ON-SITE	A-1	101.3	13.63	95.13	134.37	217.34
OFF-SITE	F-1	7.5	0.12	4.25	6.62	11.82
	G-1	0.9	0.13	0.88	1.25	2.02
	G-2	0.5	0.07	0.48	0.68	1.09
	G-3	3.4	0.46	3.18	4.50	7.27
	G-4	0.1	0.01	0.09	0.13	0.21
Total (Unmitigated)		113.8	14.40	103.93	147.41	239.55

The total Q's shown above are the combined peak discharge values at the existing culvert on the southeast corner of the site and correspond to the sum of the discharge values for each sub area. Refer to **Appendix D** for the AES output.

Note that existing condition sub-basin boundaries were delineated independently of proposed conditions boundaries: for instance, existing conditions subbasin A-1 is not the same area as proposed conditions sub-basin A-1.

The Proposed Conditions Drainage Map, **Exhibit C-2** that corresponds to the proposed condition rational method can be located in **Appendix C**. Full output from the proposed conditions hydrology AES models are provided in **Appendix E**. A summary of the AES model's onsite proposed conditions 100-year peak flows is shown in **Table 4-2.**

Table 4-2: Onsite Proposed Conditions Hydrology Results:

Sub-basin ID		Sub-basin Area (ac)	Q_2 (cfs)	Q_{10} (cfs)	Q_{25} (cfs)	Q_{100} (cfs)
ON-SITE	A-1	25.1	31.81	55.56	70.57	95.29
	B-1	2.1	2.55	4.5	5.67	7.68
	B-2	1.5	1.8	3.15	4.04	5.49
	B-3	2.6	3.48	6.01	7.52	10.1
	B-4	3.7	3.24	5.52	6.99	9.46
	B-5	2.1	2.65	4.63	5.88	7.91
	B-6	2.1	2.65	4.63	5.88	7.91
	B-7	2.2	2.89	5.02	6.31	8.51
	B-8	2.4	3.08	5.38	6.8	9.16
	B-9	1.0	1.61	2.68	3.35	4.43
	B-10	0.9	1.51	2.51	3.14	4.16
	B-11	3.8	4.28	7.4	9.44	12.96
	B-12	5.0	5.39	9.44	12.02	16.3
	B-13	3.5	3.72	6.68	8.32	11.2
	B-14	14.9	18.94	33.08	41.94	56.79
	C-1	4.7	4.91	8.75	10.99	14.84
	C-2	1.0	1.09	1.93	2.41	3.31
	C-3	0.4	0.59	0.98	1.21	1.61
	C-4	2.1	2.58	4.55	5.74	7.71
	C-5	2.1	2.57	4.55	5.73	7.7
	C-6	1.8	2.24	3.89	4.88	6.58
	C-7	0.6	0.91	1.56	1.95	2.6
	C-8	1.6	2.13	3.65	4.59	6.16
	C-9	0.3	0.43	0.73	0.9	1.2
	C-10	6.4	3.67	6.23	8.14	11.25
	C-11	5.3	7.04	12.32	15.32	20.75
	D-1	1.1	0.48	0.79	1.02	1.44
	E-1	1.4	0.88	1.46	1.89	2.60
OFF-SITE	F-1	7.5	3.37	5.57	7.18	10.14
	G-1	0.9	0.42	0.70	0.90	1.27
	G-2	0.5	0.23	0.38	0.49	0.69
	G-3	3.4	1.52	2.51	3.23	4.57
Total (Unmitigated)		**113.7**	**124.7**	**216.7**	**274.4**	**371.8**
Total (Mitigated)		**~**	**~**	**~**	**~**	**45.0**

The total flows shown above are the sum of the discharge values for each sub area. Refer to **Appendix E** for the AES output. The total unmitigated discharge values are the on-site plus off-site flows to the existing culvert if no BMP's were proposed on-site. The total mitigated discharge values are the actual on-site flows to the existing culvert mitigated by the three proposed infiltration basins, plus the unmitigated off-site flows tributary to the culvert. Slight discrepancies between areas or peak flows shown above and the AES output results presented in the appendices are inherent rounding errors as a result of AES's model and the inputs provided. Any discrepancies presented are minor in nature and do not affect the overall design of the site.

Results are presented for all four of the studied storm event frequencies, but onsite hydraulic drainage design is performed using the 100-year peak flows to provide adequate conveyance for onsite infiltration and retention requirements.

The total project area was used in the Unit Hydrograph method for calculating the site's runoff hydrograph. Results from the 24-hour Unit Hydrograph analyses for all onsite basins are prepared in **Appendix F**.

5 WATER QUALITY AND LOW IMPACT DEVELOPMENT REQUIREMENTS

5.1 STORMWATER TREATMENT

The proposed project will provide water quality by means of infiltration. Please see the project's Water Quality management Plan (WQMP) for further descriptions and sizing calculations for the proposed infiltration BMP's.

5.2 STORMWATER IMPROVEMENTS

Improvements required for this project include grate inlets, cleanouts, varying sizes of storm drain pipe (12", 30", 36", and 48"), and three vegetated infiltration basins. The proposed storm drain improvements are shown on the Proposed Conditions Exhibit within **Appendix C.**

5.3 STORMWATER MAINTENANCE

Stormwater facilities require routine maintenance to operate efficiently. It is recommended that facilities be inspected prior to the rainy season (October through April) and after each runoff producing storm event. Sediment and debris shall be removed from the pre-treatment system to maintain the systems effectiveness. The retention basin shall be routinely inspected and sediment/debris build up removed to maintain efficient operation of the basin.

6 HYDRAULICS ANALYSIS

6.1 METHODOLOGY

Drainage structures were designed for the Pepper 210 Commerce Center development according to the procedures and methodologies outlined in the *San Bernardino County Flood Control District Standard Plans* and *Detention Basin Design Criteria for San Bernardino County* (1987). Onsite flows will be conveyed to three vegetated infiltration basins, as well as to the existing storm drain culvert on the southeast corner of the property. The proposed drainage network is provided on the Proposed Conditions Drainage Map, **Exhibit C-2** located within **Appendix C**. The proposed storm drains were analyzed using the AES computer software.

6.1.1 INFILTRATION BASIN STANDARDS

The proposed onsite infiltration basins have been sized to capture and infiltrate the peak flow rates from the proposed 100-year storm event. Flows will be mitigated to not exceed 90% of the existing 25-year peak flow rates per the Interoffice Memo dated September 4, 1987. The proposed infiltration basins will be defined as local basins per the Detention Basin Design Criteria for San Bernardino County, located within **Appendix G**. since they will not be incorporated into the Flood Control District's drainage system, will not be owned by the Flood Control District, and will not considered in downsizing future downstream storm drain The following San Bernardino County standards were used in the design of the proposed basin:

- Local detention basins shall not be fed by natural drainage areas greater than 0.5 square mile.
- Detention basin outlets shall be sized so the basin will drain within 24 hours after the basin reaches its 100-year peak depth/volume.
- Inletting storm drains shall be at minimum 24 inch pipe diameter.

6.1.2 STORM DRAIN DESIGN

The storm drain system has been designed to store water on the surface in the 100-year storm event. Storm drain hydraulic calculations will be prepared for the storm drain facilities.

- On site storm drains will be designed to convey the 100 year storm event's peak flow rates to the onsite underground infiltration basin.
- Any storm drain designed for the 100 year storm event that are under pressure will be designed with water tight joints to operate under pressurized flow.

6.2 HYDRAULIC ANALYSIS

The proposed storm drain hydraulics were analyzed using the AES computer software, and these outputs are provided in **Appendix E.**

6.2.1 STORM DRAIN PIPE CALCULATIONS

Storm drain pipe sizes were determined using the flowrates from the proposed AES hydrologic analysis. Storm drain pipes onsite are proposed to be HDPE pipe and a Manning's Roughness Coefficient value of 0.013 was used.

6.3 INFILTRATION BASIN ANALYSIS

Multiple onsite vegetated infiltration basins will be constructed with the project to infiltrate flow from the project area. Hydrographs were created using the AES software for the 100 year 24-hr storm event. This software generates a hydrograph from user defined input variables per the *San Bernardino County Hydrology Manual* (November 1986). The 24-hr storm event produces the largest volume and was used for the purposes of sizing the infiltration basins.

The volume of the infiltration basin was determined based on the inflow hydrograph and the rate of infiltration. An infiltration rate of 40.1 in/hr was determined based on infiltration tests performed per San Bernardino County Department of Environmental Health Services (Soil Infiltration Study, prepared by Tetra Tech BAS, Inc., dated August 11, 2022). A factor of safety of 5.0 has been applied to the results to yield an infiltration rate of 8.0 in/hr. This encompasses a 2.0 factor of safety to account for site suitability consideration, and a 2.5 factor of safety to account for the infiltration system design considerations. The overall surface area of infiltration was used for the stage storage discharge curve.

The inflow hydrographs developed from AES were input into Microsoft Excel, where the infiltration rate of the soil and the capacity of the existing culvert were taken into account. The remaining flow volumes, after infiltration and existing culvert capacities were reached, were used in sizing the basins. Pretreatment facilities have been designed to reduce the risk of silts and sediments reducing the effectiveness of the infiltration facility. Results of the infiltration tests and retention analysis are presented in **Appendix G**. Peak flows from drainage area D-1 will sheetflow to Highland Ave, and peak flows from drainage areas E-1 and F-1 will flow directly to the existing storm drain culvert.

Drainage areas A and B will flow to BMP's #1 and #2, respectively, and the infiltration basins will be able to store and infiltrate the entirety of the peak 100-year storm event. Drainage area C will flow to BMP #3, and the BMP will store and infiltrate most of the peak 100-year storm event. The rest of the flows through drainage area C will enter the basin and be outletted to the existing storm drain culvert. The flows from offsite drainage area F, offsite drainage area G, drainage area E, and the overflows from drainage area C will be routed to the existing storm drain culvert, not to exceed the maximum capacity of 45 cfs for the culvert.

Table 6-1: Drainage Basin Summary

Drainage Area ID	Drainage Area (AC)	Tributary To
A	24.69	BMP #1
B	48.33	BMP #2
C	26.39	BMP #3
D	1.18	Highland Ave
E	0.82	Lytle Creek
F	7.54	Lytle Creek
G	4.84	Lytle Creek

Table 6-2: BMP Summary

BMP's	Bottom Area (SF)	Top Area (SF)	Ponding Depth (FT)	Maximum Water Surface Elevation (FT)	Volume (CF)	Volume (AC-FT)	Drawdown Time (HR)
BMP #1	29,262	48,567	9.50	1321.50	369,688	8.49	16.87
BMP #2	8,545	83,808	15.74	1321.15	726,633	16.68	18.95
BMP #3	1,192	11,962	8.51	1303.01	55,970	1.28	68.22

7 CONCLUSION

The 100-year analysis for proposed conditions compares the flows from the proposed 100-year rainfall storm event to the existing 25-year rainfall storm event. Although existing soil conditions is defined as AMC III, the analysis utilizes AMC II for existing conditions and AMC III for proposed conditions. Proposed 100-year mitigated flows will not exceed 90% of the existing 25-year flows. These standards are outlined in the Interoffice Memo, dated September 4, 1987, and included within **Appendix H**.

7.1 INTEROFFICE MEMO (SEPTEMBER 4, 1987) STANDARDS

Table 7-1 compares onsite and offsite flows for the existing and proposed conditions per the standards referenced in the September 4, 1987 Interoffice Memo.

Table 7-1: Results Per September 4, 1987 Interoffice Memo

Discharge Location	Existing		Proposed (Unmitigated)		Proposed (Mitigated)	Peak Flow Change - Existing 25-year to Proposed 100-year	
	Acres	25-year (cfs)	Acres	100-year (cfs)	100-year (cfs)	Proposed (cfs)	%
Discharge from Site	101.31	134.37	101.31	355.14	28.34	-106.03	78.91
Discharge from Offsite (DA F and G)	12.37	13.04	12.37	16.66	16.66	3.62	27.76
Culvert to Lytle Creek	~	45	~	45	45	0	0.00

The 25-year storm discharge for the existing condition comes from Table 4-1 for the onsite and offsite areas. The unmitigated 100-year storm discharge for the proposed condition comes from Table 4-2. The mitigated 100-year storm discharge for the proposed condition is also from Table 4-2 and takes into account the flows from Drainage Area E, and the overflows from Basin C.

APPENDICES

APPENDIX A

NOAA ATLAS 14 PRECIPITATION ESTIMATES

NOAA Atlas 14, Volume 6, Version 2
Location name: Rialto, California, USA*
Latitude: 34.1371°, Longitude: -117.355°
Elevation: 1316.54 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

PRECIPITATION

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	0.129 (0.108-0.157)	0.170 (0.142-0.207)	0.225 (0.187-0.275)	0.271 (0.223-0.333)	0.335 (0.266-0.426)	0.385 (0.299-0.500)	0.437 (0.331-0.582)	0.492 (0.362-0.675)	0.569 (0.402-0.815)	0.631 (0.430-0.936)
10-min	0.185 (0.154-0.225)	0.244 (0.203-0.297)	0.323 (0.268-0.394)	0.389 (0.319-0.478)	0.480 (0.381-0.610)	0.551 (0.429-0.717)	0.626 (0.475-0.835)	0.705 (0.519-0.968)	0.816 (0.576-1.17)	0.905 (0.616-1.34)
15-min	0.224 (0.186-0.272)	0.296 (0.246-0.359)	0.391 (0.324-0.476)	0.470 (0.386-0.578)	0.580 (0.460-0.738)	0.667 (0.518-0.867)	0.757 (0.574-1.01)	0.853 (0.628-1.17)	0.987 (0.696-1.41)	1.10 (0.745-1.62)
30-min	0.332 (0.276-0.403)	0.438 (0.364-0.532)	0.579 (0.480-0.706)	0.696 (0.572-0.856)	0.859 (0.682-1.09)	0.988 (0.768-1.28)	1.12 (0.850-1.50)	1.26 (0.930-1.73)	1.46 (1.03-2.09)	1.62 (1.10-2.40)
60-min	0.489 (0.407-0.594)	0.645 (0.536-0.784)	0.852 (0.706-1.04)	1.02 (0.842-1.26)	1.26 (1.00-1.61)	1.46 (1.13-1.89)	1.65 (1.25-2.20)	1.86 (1.37-2.55)	2.15 (1.52-3.08)	2.39 (1.63-3.54)
2-hr	0.720 (0.599-0.874)	0.931 (0.774-1.13)	1.21 (1.00-1.48)	1.44 (1.18-1.77)	1.76 (1.40-2.24)	2.00 (1.56-2.61)	2.26 (1.71-3.01)	2.53 (1.86-3.46)	2.89 (2.04-4.14)	3.19 (2.17-4.72)
3-hr	0.899 (0.748-1.09)	1.16 (0.959-1.40)	1.49 (1.24-1.82)	1.77 (1.45-2.17)	2.15 (1.70-2.73)	2.44 (1.90-3.17)	2.74 (2.08-3.65)	3.05 (2.25-4.19)	3.48 (2.46-4.99)	3.82 (2.60-5.67)
6-hr	1.29 (1.08-1.57)	1.65 (1.37-2.01)	2.12 (1.76-2.58)	2.50 (2.06-3.08)	3.02 (2.40-3.84)	3.42 (2.66-4.44)	3.82 (2.90-5.10)	4.24 (3.12-5.82)	4.81 (3.40-6.89)	5.26 (3.58-7.80)
12-hr	1.73 (1.44-2.10)	2.22 (1.85-2.70)	2.86 (2.37-3.48)	3.37 (2.77-4.14)	4.06 (3.22-5.16)	4.58 (3.56-5.96)	5.11 (3.87-6.81)	5.65 (4.16-7.76)	6.38 (4.50-9.14)	6.94 (4.73-10.3)
24-hr	2.33 (2.06-2.68)	3.02 (2.67-3.48)	3.91 (3.45-4.52)	4.63 (4.05-5.40)	5.59 (4.73-6.73)	6.31 (5.24-7.76)	7.04 (5.70-8.87)	7.78 (6.13-10.1)	8.78 (6.64-11.8)	9.54 (6.97-13.3)
2-day	2.85 (2.52-3.28)	3.76 (3.33-4.34)	4.95 (4.37-5.73)	5.92 (5.18-6.90)	7.23 (6.12-8.70)	8.23 (6.83-10.1)	9.24 (7.48-11.6)	10.3 (8.10-13.3)	11.7 (8.84-15.8)	12.8 (9.34-17.8)
3-day	3.03 (2.68-3.49)	4.07 (3.60-4.70)	5.45 (4.81-6.30)	6.58 (5.76-7.67)	8.14 (6.89-9.80)	9.35 (7.75-11.5)	10.6 (8.58-13.3)	11.9 (9.36-15.4)	13.7 (10.3-18.4)	15.0 (11.0-21.0)
4-day	3.23 (2.86-3.72)	4.39 (3.88-5.06)	5.92 (5.23-6.85)	7.20 (6.30-8.40)	8.97 (7.60-10.8)	10.4 (8.59-12.7)	11.8 (9.55-14.9)	13.3 (10.5-17.2)	15.4 (11.6-20.7)	17.0 (12.5-23.8)
7-day	3.66 (3.24-4.22)	5.02 (4.44-5.79)	6.85 (6.04-7.92)	8.37 (7.32-9.76)	10.5 (8.88-12.6)	12.2 (10.1-15.0)	13.9 (11.3-17.5)	15.7 (12.4-20.4)	18.3 (13.8-24.7)	20.3 (14.9-28.3)
10-day	3.98 (3.52-4.58)	5.49 (4.86-6.34)	7.53 (6.64-8.71)	9.24 (8.08-10.8)	11.6 (9.84-14.0)	13.5 (11.2-16.6)	15.5 (12.5-19.5)	17.6 (13.8-22.7)	20.5 (15.5-27.6)	22.8 (16.7-31.8)
20-day	4.85 (4.29-5.59)	6.77 (5.98-7.80)	9.36 (8.26-10.8)	11.6 (10.1-13.5)	14.6 (12.4-17.6)	17.1 (14.2-21.0)	19.7 (15.9-24.8)	22.4 (17.7-29.0)	26.3 (19.9-35.5)	29.4 (21.5-41.1)
30-day	5.71 (5.06-6.58)	7.99 (7.06-9.21)	11.1 (9.78-12.8)	13.7 (12.0-16.0)	17.4 (14.7-21.0)	20.4 (16.9-25.0)	23.5 (19.0-29.6)	26.8 (21.1-34.7)	31.6 (23.9-42.6)	35.4 (25.9-49.4)
45-day	6.84 (6.06-7.88)	9.53 (8.43-11.0)	13.2 (11.6-15.3)	16.3 (14.3-19.0)	20.7 (17.5-25.0)	24.3 (20.1-29.8)	28.0 (22.7-35.3)	32.0 (25.2-41.4)	37.7 (28.5-50.9)	42.3 (31.0-59.1)
60-day	7.99 (7.08-9.21)	11.0 (9.77-12.7)	15.2 (13.4-17.6)	18.8 (16.4-21.9)	23.8 (20.1-28.7)	27.8 (23.1-34.2)	32.1 (26.0-40.4)	36.7 (28.9-47.5)	43.3 (32.7-58.3)	48.6 (35.5-67.8)

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

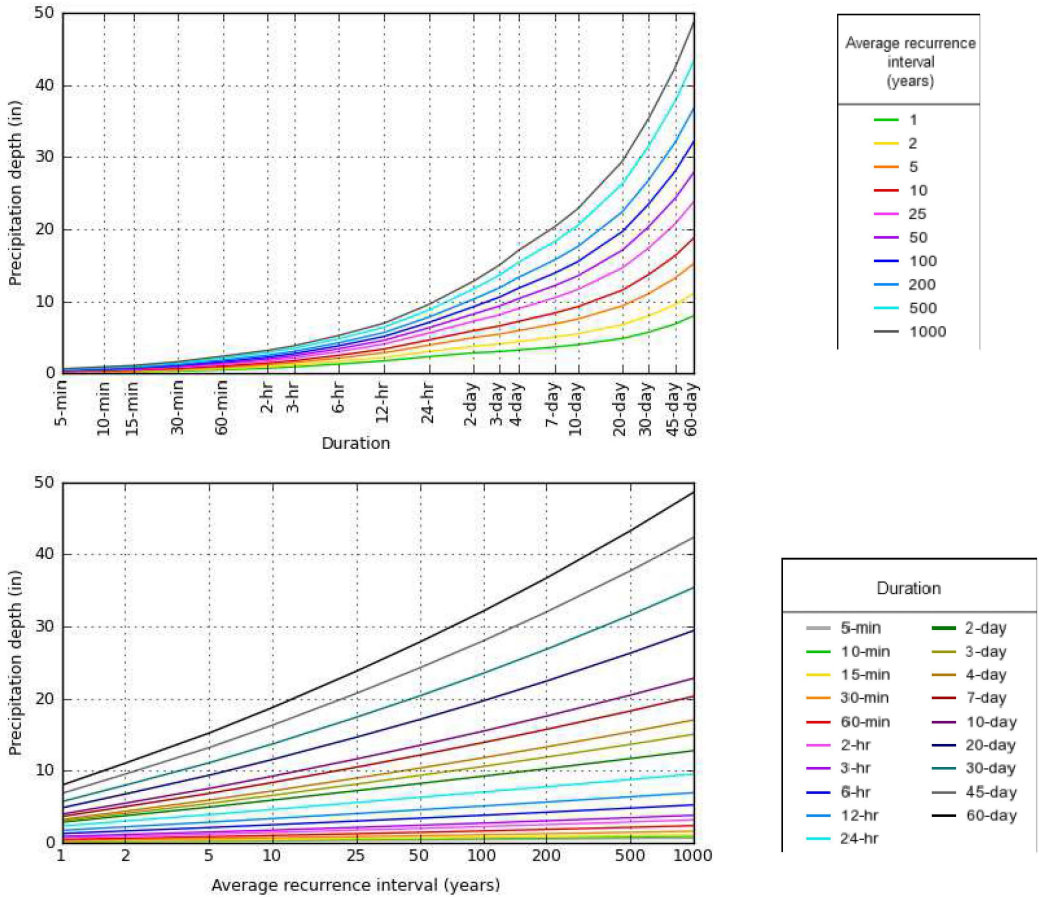
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper 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.

Back to Top

PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 34.1371°, Longitude: -117.3550°



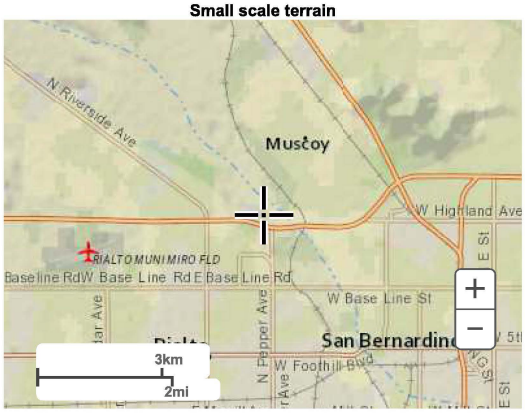
NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Tue Aug 16 07:03:03 2022

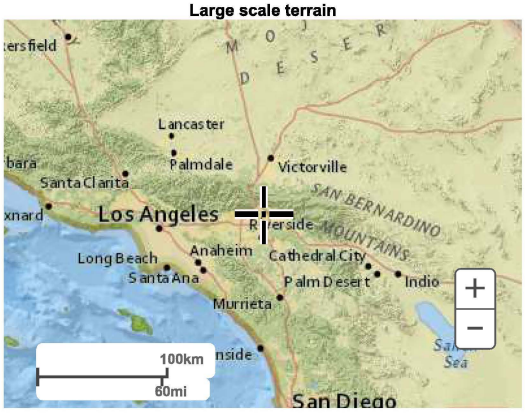
Back to Top

Maps & aerials

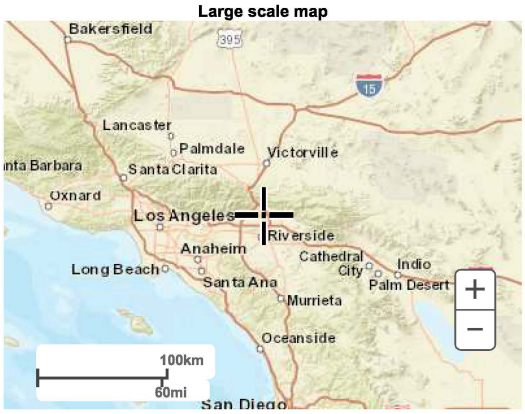
Small scale terrain



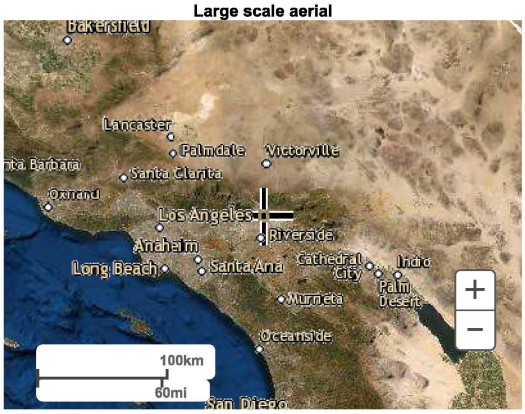
Large scale terrain



Large scale map



Large scale aerial



Back to Top

US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

NOAA Atlas 14, Volume 6, Version 2
Location name: Rialto, California, USA*
Latitude: 34.1369°, Longitude: -117.3546°
Elevation: 1311.47 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

INTENSITY

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	1.55 (1.30-1.88)	2.04 (1.70-2.48)	2.70 (2.24-3.30)	3.25 (2.68-4.00)	4.02 (3.19-5.11)	4.62 (3.59-6.00)	5.24 (3.97-6.98)	5.90 (4.34-8.10)	6.83 (4.82-9.78)	7.57 (5.16-11.2)
10-min	1.11 (0.924-1.35)	1.46 (1.22-1.78)	1.94 (1.61-2.36)	2.33 (1.91-2.87)	2.88 (2.29-3.66)	3.31 (2.57-4.30)	3.76 (2.85-5.01)	4.23 (3.11-5.81)	4.90 (3.46-7.01)	5.43 (3.70-8.05)
15-min	0.896 (0.744-1.09)	1.18 (0.984-1.44)	1.56 (1.30-1.90)	1.88 (1.54-2.31)	2.32 (1.84-2.95)	2.67 (2.07-3.47)	3.03 (2.30-4.04)	3.41 (2.51-4.68)	3.95 (2.78-5.65)	4.38 (2.98-6.49)
30-min	0.664 (0.552-0.806)	0.876 (0.728-1.06)	1.16 (0.960-1.41)	1.39 (1.14-1.71)	1.72 (1.36-2.19)	1.98 (1.54-2.57)	2.24 (1.70-2.99)	2.53 (1.86-3.47)	2.92 (2.06-4.19)	3.24 (2.21-4.81)
60-min	0.489 (0.407-0.594)	0.645 (0.536-0.784)	0.852 (0.706-1.04)	1.02 (0.842-1.26)	1.26 (1.00-1.61)	1.46 (1.13-1.89)	1.65 (1.25-2.20)	1.86 (1.37-2.55)	2.15 (1.52-3.08)	2.39 (1.63-3.54)
2-hr	0.360 (0.300-0.437)	0.466 (0.387-0.566)	0.605 (0.502-0.738)	0.720 (0.592-0.885)	0.878 (0.698-1.12)	1.00 (0.778-1.30)	1.13 (0.856-1.51)	1.26 (0.930-1.73)	1.45 (1.02-2.07)	1.59 (1.08-2.36)
3-hr	0.299 (0.249-0.364)	0.385 (0.319-0.467)	0.497 (0.411-0.605)	0.588 (0.484-0.723)	0.714 (0.567-0.909)	0.812 (0.631-1.06)	0.912 (0.691-1.22)	1.02 (0.749-1.40)	1.16 (0.819-1.66)	1.27 (0.867-1.89)
6-hr	0.216 (0.180-0.262)	0.276 (0.229-0.335)	0.354 (0.293-0.432)	0.418 (0.343-0.514)	0.504 (0.400-0.641)	0.571 (0.444-0.742)	0.639 (0.484-0.851)	0.709 (0.522-0.972)	0.804 (0.567-1.15)	0.878 (0.598-1.30)
12-hr	0.144 (0.120-0.174)	0.184 (0.153-0.224)	0.237 (0.196-0.289)	0.280 (0.230-0.344)	0.337 (0.267-0.428)	0.380 (0.296-0.494)	0.424 (0.322-0.566)	0.469 (0.346-0.644)	0.530 (0.374-0.758)	0.576 (0.393-0.855)
24-hr	0.097 (0.086-0.112)	0.126 (0.111-0.145)	0.163 (0.144-0.188)	0.193 (0.169-0.225)	0.233 (0.197-0.280)	0.263 (0.218-0.323)	0.293 (0.238-0.370)	0.324 (0.256-0.420)	0.366 (0.277-0.493)	0.397 (0.291-0.554)
2-day	0.059 (0.052-0.068)	0.078 (0.069-0.090)	0.103 (0.091-0.119)	0.123 (0.108-0.144)	0.150 (0.127-0.181)	0.171 (0.142-0.211)	0.192 (0.156-0.242)	0.214 (0.169-0.277)	0.243 (0.184-0.328)	0.266 (0.195-0.371)
3-day	0.042 (0.037-0.048)	0.057 (0.050-0.065)	0.076 (0.067-0.088)	0.091 (0.080-0.107)	0.113 (0.096-0.136)	0.130 (0.108-0.160)	0.147 (0.119-0.185)	0.165 (0.130-0.214)	0.190 (0.143-0.256)	0.209 (0.153-0.292)
4-day	0.034 (0.030-0.039)	0.046 (0.040-0.053)	0.062 (0.054-0.071)	0.075 (0.066-0.087)	0.093 (0.079-0.113)	0.108 (0.090-0.133)	0.123 (0.100-0.155)	0.139 (0.109-0.179)	0.160 (0.121-0.216)	0.177 (0.130-0.248)
7-day	0.022 (0.019-0.025)	0.030 (0.026-0.034)	0.041 (0.036-0.047)	0.050 (0.044-0.058)	0.062 (0.053-0.075)	0.072 (0.060-0.089)	0.083 (0.067-0.104)	0.094 (0.074-0.121)	0.109 (0.082-0.147)	0.121 (0.088-0.169)
10-day	0.017 (0.015-0.019)	0.023 (0.020-0.026)	0.031 (0.028-0.036)	0.038 (0.034-0.045)	0.048 (0.041-0.058)	0.056 (0.047-0.069)	0.064 (0.052-0.081)	0.073 (0.058-0.095)	0.085 (0.065-0.115)	0.095 (0.070-0.133)
20-day	0.010 (0.009-0.012)	0.014 (0.012-0.016)	0.020 (0.017-0.023)	0.024 (0.021-0.028)	0.030 (0.026-0.037)	0.036 (0.030-0.044)	0.041 (0.033-0.052)	0.047 (0.037-0.060)	0.055 (0.041-0.074)	0.061 (0.045-0.086)
30-day	0.008 (0.007-0.009)	0.011 (0.010-0.013)	0.015 (0.014-0.018)	0.019 (0.017-0.022)	0.024 (0.020-0.029)	0.028 (0.023-0.035)	0.033 (0.026-0.041)	0.037 (0.029-0.048)	0.044 (0.033-0.059)	0.049 (0.036-0.069)
45-day	0.006 (0.006-0.007)	0.009 (0.008-0.010)	0.012 (0.011-0.014)	0.015 (0.013-0.018)	0.019 (0.016-0.023)	0.022 (0.019-0.028)	0.026 (0.021-0.033)	0.030 (0.023-0.038)	0.035 (0.026-0.047)	0.039 (0.029-0.055)
60-day	0.006 (0.005-0.006)	0.008 (0.007-0.009)	0.011 (0.009-0.012)	0.013 (0.011-0.015)	0.017 (0.014-0.020)	0.019 (0.016-0.024)	0.022 (0.018-0.028)	0.025 (0.020-0.033)	0.030 (0.023-0.041)	0.034 (0.025-0.047)

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

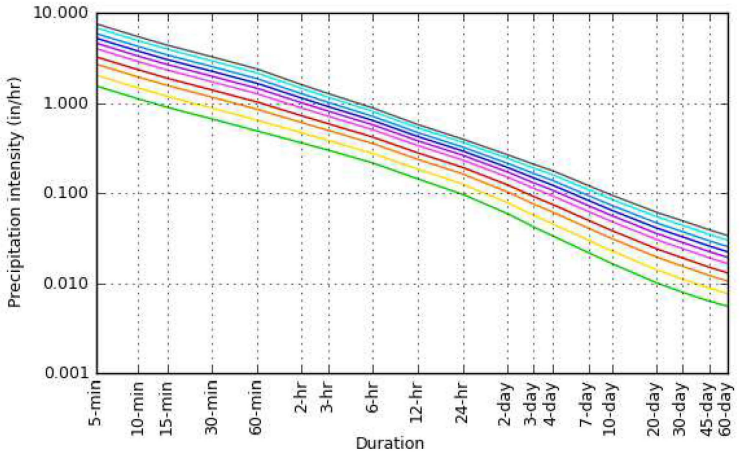
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper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

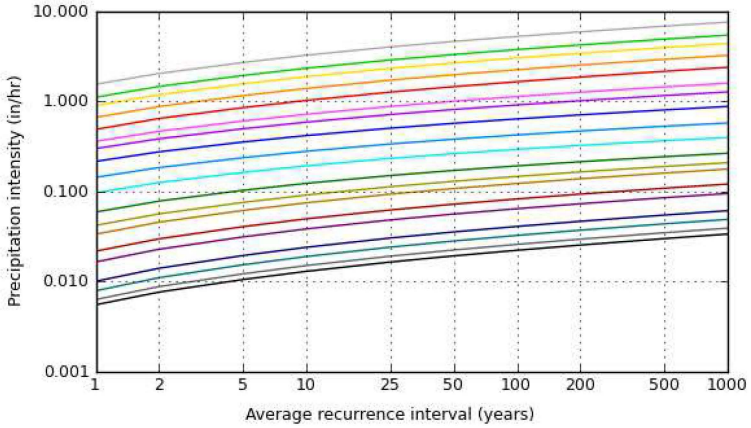
Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical

PDS-based intensity-duration-frequency (IDF) curves
Latitude: 34.1369°, Longitude: -117.3546°





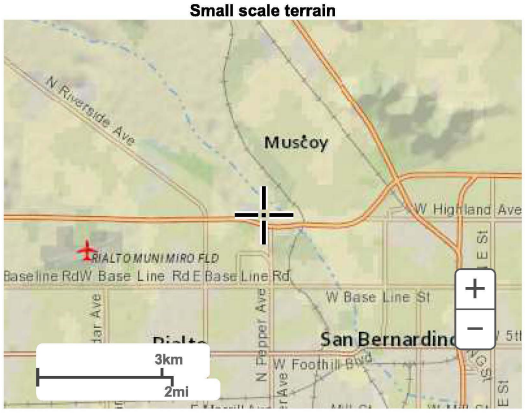
NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Tue Aug 16 17:26:43 2022

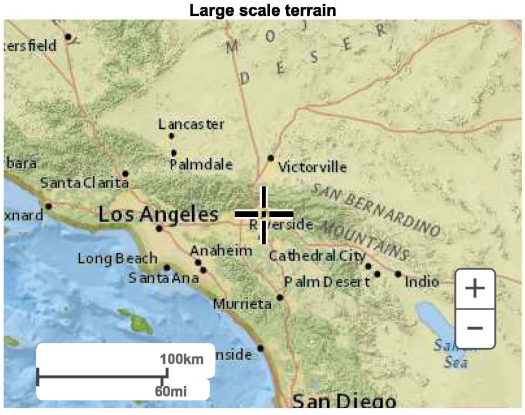
Back to Top

Maps & aerials

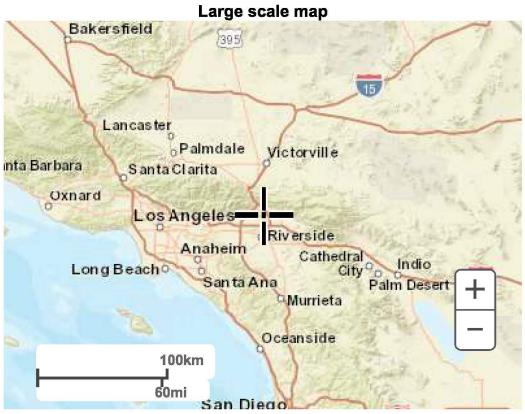
Small scale terrain



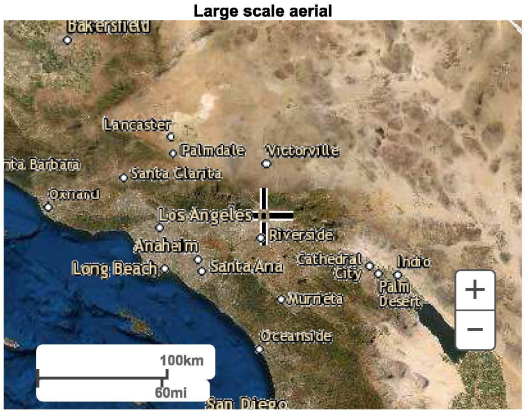
Large scale terrain



Large scale map



Large scale aerial



Back to Top

US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

APPENDIX B

FEMA FLOOD INSURANCE RATE MAP (FIRM)

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations (BFEs) shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 11 North. The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242** or visit its website at http://www.ngs.noaa.gov/.

Base map information shown on this FIRM was provided in digital format by the San Bernardino County ISD.GIS Department, United States Geological Survey, the Bureau of Land Management, the United States Department of Agriculture, and the National Geodetic Survey. The imagery was flown by U.S. Department of Agriculture Farm Service Agency in 2012 and was produced with a 1-meter ground sampling distance.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

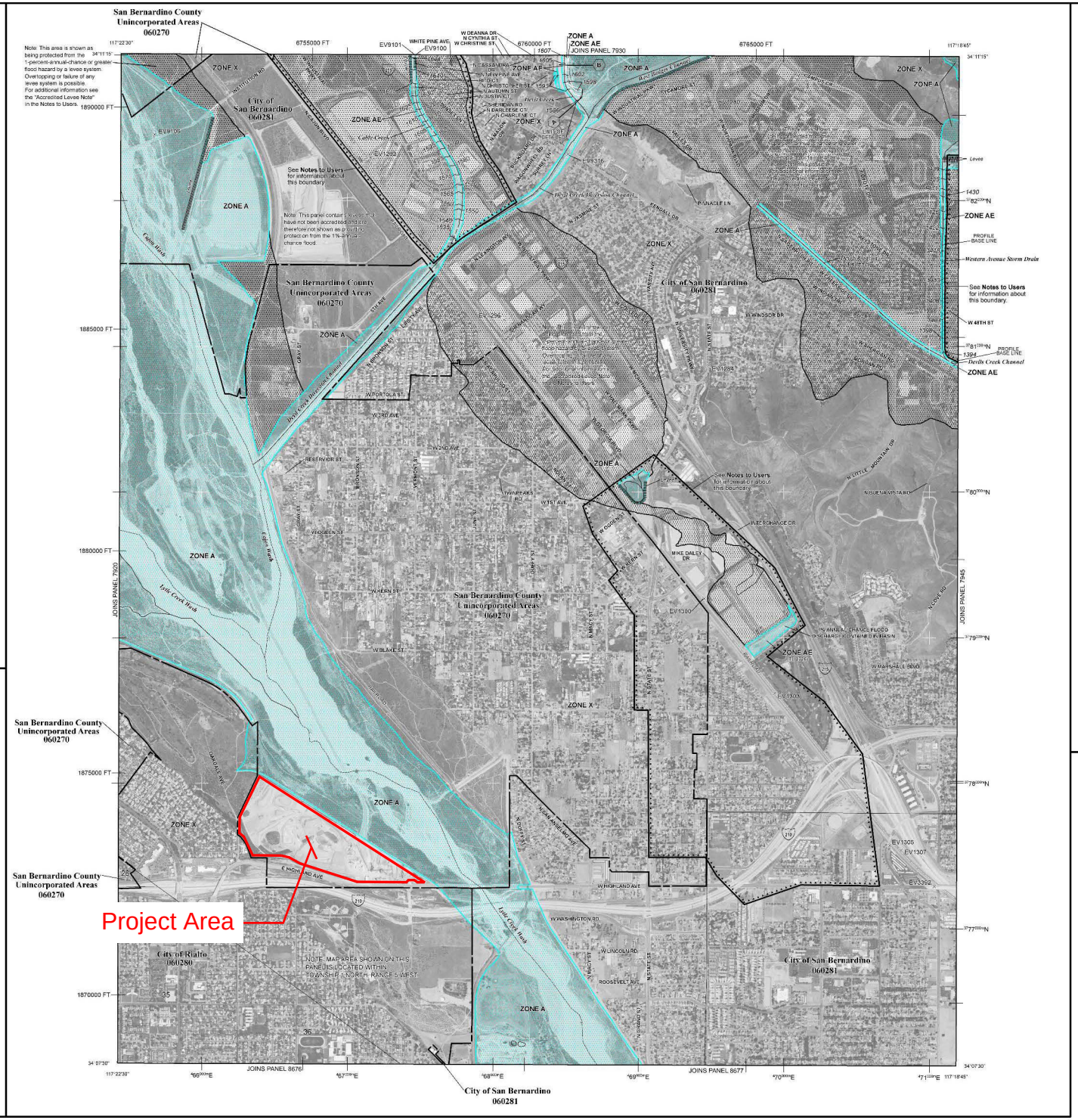
Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products, or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Map Service Center website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information eXchange.

ATTENTION: The levee, dike, or other structure that impacts flood hazards inside this boundary has not been shown to comply with Section 65.10 of the NFIP Regulations. As such, this FIRM panel will be revised at a later date to update the flood hazard information associated with this structure.

The flood hazard data inside this boundary on the FIRM panel has been republished from the previous effective (historic) FIRM for this area, after being converted from NGVD29 to NAVD88.

ACCREDITED LEVEE NOTES TO USERS: Check with your local community to obtain more information, such as the estimated level of protection provided (which may exceed the 1-percent-annual-chance level) and Emergency Action Plan, on the levee system(s) shown as providing protection for areas on this panel. To mitigate flood risk in residual risk areas, property owners and residents are encouraged to consider flood insurance and floodproofing or other protective measures. For more information on flood insurance, interested parties should visit the FEMA website at http://www.fema.gov/business/nfip/index.shtm.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- **ZONE A** No Base Flood Elevations determined.
- **ZONE AE** Base Flood Elevations determined.
- **ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- **ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- **ZONE AR** Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- **ZONE A99** Areas to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no Base Flood Elevations determined.
- **ZONE V** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- **ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

- **ZONE X** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

- **ZONE X** Areas determined to be outside the 0.2% annual chance floodplain.
- **ZONE D** Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities
- 513 (EL 987) — Base Flood Elevation line and value; elevation in feet*
- Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

- Cross section line
- Transect line
- 97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
- 4275000 FT E — 1000-meter Universal Transverse Mercator grid values, zone 11
- 6000000 FT — 5000-foot grid ticks: California State Plane coordinate system, Zone V (FIPSZONE = 405), Lambert projection
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories List on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
August 28, 2008

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
September 2, 2016 – to change Base Flood Elevations, to add Base Flood Elevations, to change Special Flood Hazard Areas, to add Special Flood Hazard Areas, to change zone designations, to incorporate previously issued Letters of Map Revision, and to reflect updated topographic information.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-9620.

MAP SCALE 1" = 1000'

PANEL 7940J

FIRM

FLOOD INSURANCE RATE MAP

SAN BERNARDINO COUNTY, CALIFORNIA AND INCORPORATED AREAS

PANEL 7940 OF 9400

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
RIALTO, CITY OF	060280	7940	J
SAN BERNARDINO COUNTY	060270	7940	J
SAN BERNARDINO, CITY OF	060281	7940	J

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06071C7940J

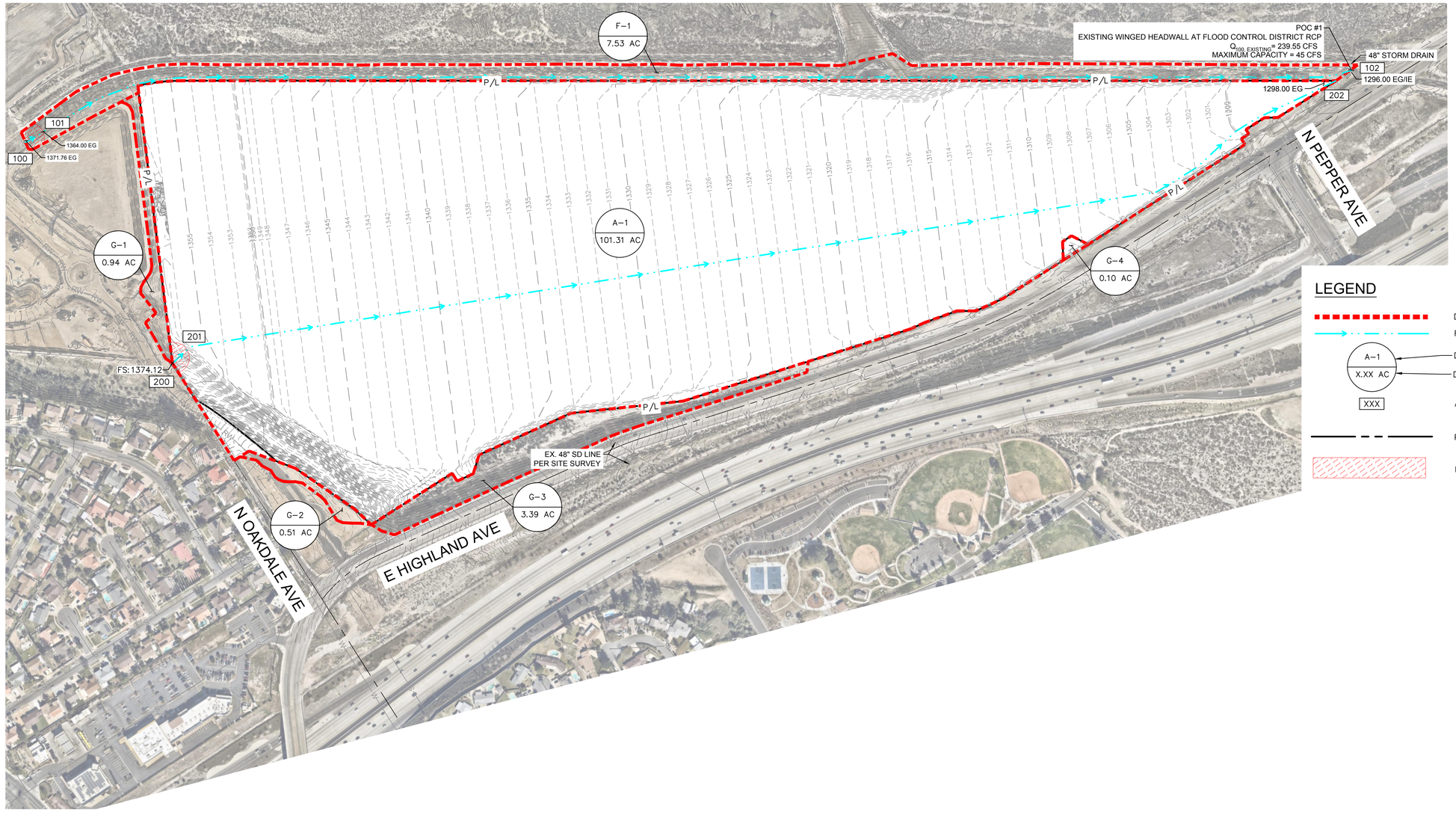
MAP REVISED
SEPTEMBER 2, 2016

Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

APPENDIX C

DRAINAGE EXHIBITS

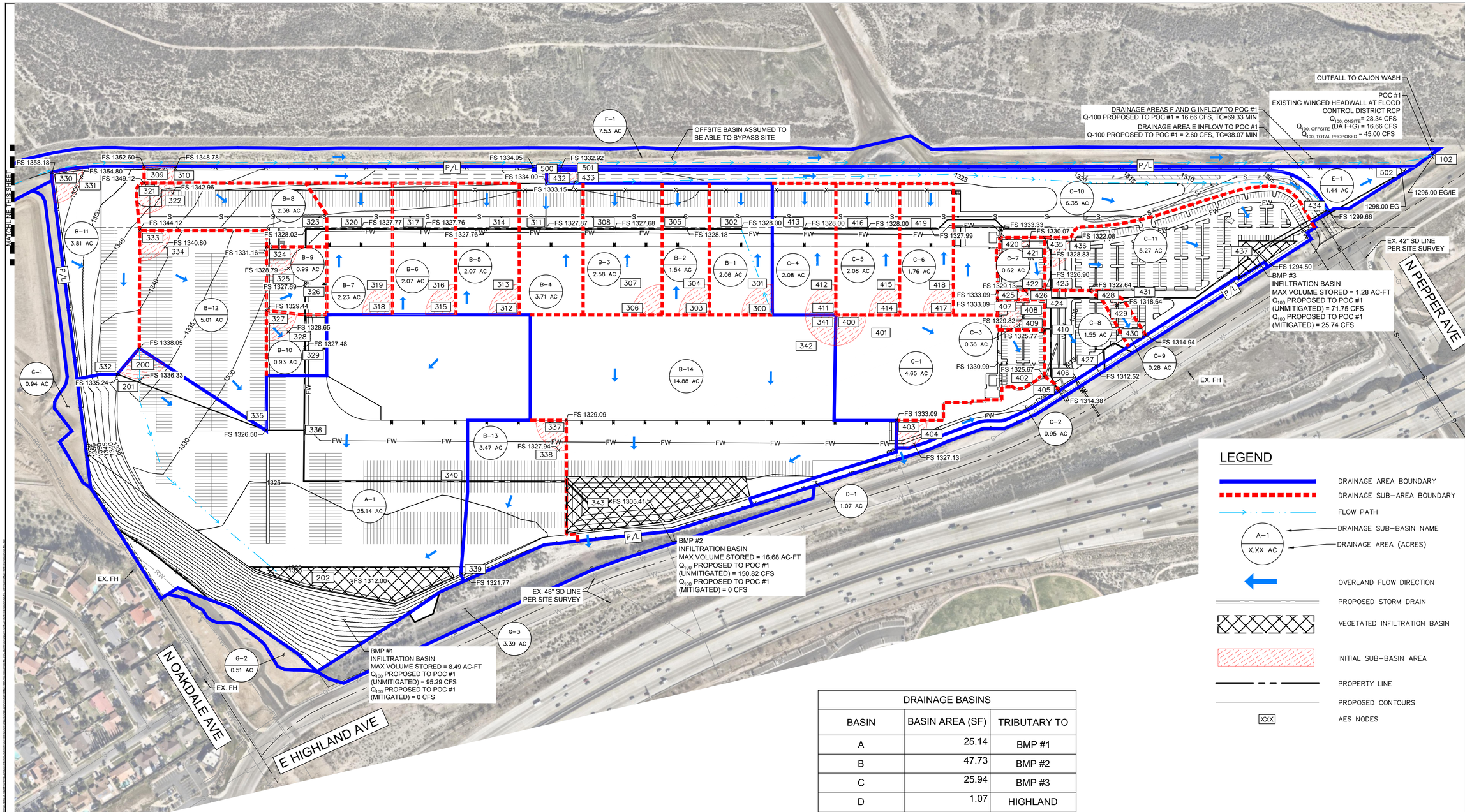


Kimley»Horn
401 B STREET, SUITE 600,
SAN DIEGO, CA 92101
PHONE: 619-234-9411
WWW.KIMLEY-HORN.COM

2400 HIGHLAND AVE

EXHIBIT:
CITY OF SAN BERNARDINO
EXISTING CONDITIONS DRAINAGE MAP
CARSON BBC LOGISTICS CENTER LLC

JOB NO.:	195425001
DATE:	2023-11-17
X	OF X



LEGEND

- DRAINAGE AREA BOUNDARY
- DRAINAGE SUB–AREA BOUNDARY
- FLOW PATH
- A–1 / X.XX AC — DRAINAGE SUB–BASIN NAME / DRAINAGE AREA (ACRES)
- OVERLAND FLOW DIRECTION
- PROPOSED STORM DRAIN
- VEGETATED INFILTRATION BASIN
- INITIAL SUB–BASIN AREA
- PROPERTY LINE
- PROPOSED CONTOURS
- XXX — AES NODES

DRAINAGE BASINS		
BASIN	BASIN AREA (SF)	TRIBUTARY TO
A	25.14	BMP #1
B	47.73	BMP #2
C	25.94	BMP #3
D	1.07	HIGHLAND
E	1.44	LYTLE
F	7.53	LYTLE
G	4.84	LYTLE

BMPS							
BMP	BOTTOM AREA (SF)	TOP AREA (SF)	PONDING DEPTH (FT)	MAX WATER SURFACE ELEVATION (FT)	VOLUME (CF)	VOLUME (ACFT)	DRAWDOWN TIME (HR)
BMP #1	29,262	48,567	9.50	1321.50	369,688	8.49	16.87
BMP #2	8,545	83,808	15.74	1321.15	726,633	16.68	18.95
BMP #3	1,192	11,962	8.51	1303.01	55,970	1.28	68.22

NORTH

GRAPHIC SCALE IN FEET
0 75 150 300

Kimley»Horn
401 B STREET, SUITE 600,
SAN DIEGO, CA 92101
PHONE: 619-234-9411
WWW.KIMLEY-HORN.COM

2400 HIGHLAND AVENUE

EXHIBIT:
CITY OF SAN BERNARDINO
PROPOSED CONDITIONS DRAINAGE MAP
CARSON BBC LOGISTICS CENTER LLC

JOB NO.: 195425001
DATE: 2023-11-17
X OF X

APPENDIX D

EXISTING CONDITIONS HYDROLOGY AES RATIONAL METHOD RESULTS

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        (c) Copyright 1983-2011 Advanced Engineering Software (aes)
            Ver. 18.0  Release Date: 07/01/2011  License ID 1499

                          Analysis prepared by:



 ************************ DESCRIPTION OF STUDY ************************
* 2400 HIGHLAND                                                      *
* 2 YEAR RECURRENCE INTERVAL                                         *
* EXISTING CONDITIONS                                                *
 **********************************************************************

  FILE NAME: CARS2E.DAT
  TIME/DATE OF STUDY: 13:35 11/16/2023
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED TABLED RAINFALL USED*
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)    5.00;  2.040
   2)   10.00;  1.460
   3)   15.00;  1.180
   4)   30.00;  0.876
   5)   60.00;  0.645
   6)  120.00;  0.466
   7)  180.00;  0.380
   8)  360.00;  0.276
   9)  720.00;  0.184
  *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
```

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

****************************************************************************
  FLOW PROCESS FROM NODE    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) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1371.76  DOWNSTREAM(FEET) =   1364.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.523
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.979
  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"                    A        0.10      0.67     1.000    61    5.52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.67
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.12
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.12

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1364.00  DOWNSTREAM(FEET) =   1296.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  4918.00   CHANNEL SLOPE =  0.0138
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.536
  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"                    A        3.72      0.67     1.000    61
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.67
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
```

```
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.16
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.90
  AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =  91.13
  Tc(MIN.) =   96.65
  SUBAREA AREA(ACRES) =     3.72       SUBAREA RUNOFF(CFS) =    0.00
  EFFECTIVE AREA(ACRES) =      3.82     AREA-AVERAGED Fm(INCH/HR) =   0.67
  AREA-AVERAGED Fp(INCH/HR) =   0.67  AREA-AVERAGED Ap =   1.00
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TOTAL AREA(ACRES) =        3.8         PEAK FLOW RATE(CFS) =       0.12
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   0.96
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =    5018.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   96.65
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.536
  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"                    A        3.72      0.67     1.000    61
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.67
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  SUBAREA AREA(ACRES) =    3.72      SUBAREA RUNOFF(CFS) =    0.00
  EFFECTIVE AREA(ACRES) =      7.54   AREA-AVERAGED Fm(INCH/HR) =  0.67
  AREA-AVERAGED Fp(INCH/HR) =  0.67  AREA-AVERAGED Ap =  1.00
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TOTAL AREA(ACRES) =        7.5       PEAK FLOW RATE(CFS) =       0.12
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1374.12  DOWNSTREAM(FEET) =   1360.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
```

```
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.040
  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"                    A        0.10      0.67     1.000    61    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.67
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.12
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.12

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1360.00  DOWNSTREAM(FEET) =   1298.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  4445.00   CHANNEL SLOPE =  0.0139
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.815
  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"                    A       53.08      0.67     1.000    61
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.67
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.50
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.25
  AVERAGE FLOW DEPTH(FEET) =   0.17   TRAVEL TIME(MIN.) =  32.87
  Tc(MIN.) =   37.87
  SUBAREA AREA(ACRES) =    53.08       SUBAREA RUNOFF(CFS) =    7.14
  EFFECTIVE AREA(ACRES) =     53.18     AREA-AVERAGED Fm(INCH/HR) =   0.67
  AREA-AVERAGED Fp(INCH/HR) =   0.67  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       53.2          PEAK FLOW RATE(CFS) =       7.15

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.18   FLOW VELOCITY(FEET/SEC.) =   2.27
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =    4545.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   37.87
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.815
```

```
  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"                    A       53.08      0.67     1.000    61
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.67
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   53.08      SUBAREA RUNOFF(CFS) =    7.14
  EFFECTIVE AREA(ACRES) =    106.26   AREA-AVERAGED Fm(INCH/HR) =  0.67
  AREA-AVERAGED Fp(INCH/HR) =  0.67  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      106.3       PEAK FLOW RATE(CFS) =      14.29
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      106.3  TC(MIN.) =     37.87
  EFFECTIVE AREA(ACRES) =    106.26  AREA-AVERAGED Fm(INCH/HR)=  0.67
  AREA-AVERAGED Fp(INCH/HR) =  0.67  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =      14.29
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```



```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        (c) Copyright 1983-2011 Advanced Engineering Software (aes)
            Ver. 18.0  Release Date: 07/01/2011  License ID 1499

                          Analysis prepared by:



 ************************ DESCRIPTION OF STUDY ************************
* 2400 HIGHLAND                                                      *
* 10 YEAR RECURRENCE INTERVAL                                        *
* EXISTING CONDITIONS                                                *
 **********************************************************************

  FILE NAME: CARS10E.DAT
  TIME/DATE OF STUDY: 13:38 11/16/2023
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED TABLED RAINFALL USED*
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)    5.00;  3.250
   2)   10.00;  2.330
   3)   15.00;  1.880
   4)   30.00;  1.390
   5)   60.00;  1.020
   6)  120.00;  0.720
   7)  180.00;  0.588
   8)  360.00;  0.418
   9)  720.00;  0.280
  *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 0.0312 0.167 0.0150
```

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

****************************************************************************
  FLOW PROCESS FROM NODE    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) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1371.76  DOWNSTREAM(FEET) =   1364.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.523
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.154
  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"                    A        0.10      0.42     1.000    78    5.52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.25
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.25

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1364.00  DOWNSTREAM(FEET) =   1296.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  4918.00   CHANNEL SLOPE =  0.0138
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.042
  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"                    A        3.72      0.42     1.000    78
  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) =       1.60
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.56
```

```
  AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =  52.66
  Tc(MIN.) =   58.19
  SUBAREA AREA(ACRES) =     3.72       SUBAREA RUNOFF(CFS) =    2.10
  EFFECTIVE AREA(ACRES) =      3.82     AREA-AVERAGED Fm(INCH/HR) =   0.42
  AREA-AVERAGED Fp(INCH/HR) =   0.42  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        3.8         PEAK FLOW RATE(CFS) =       2.15

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.11   FLOW VELOCITY(FEET/SEC.) =   1.75
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =    5018.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   58.19
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.042
  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"                    A        3.72      0.42     1.000    78
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.72      SUBAREA RUNOFF(CFS) =    2.10
  EFFECTIVE AREA(ACRES) =      7.54   AREA-AVERAGED Fm(INCH/HR) =  0.42
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        7.5       PEAK FLOW RATE(CFS) =       4.25

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1374.12  DOWNSTREAM(FEET) =   1360.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.250
  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"                    A        0.10      0.42     1.000    78    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.26
```

```
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.26

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1360.00  DOWNSTREAM(FEET) =   1298.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  4445.00   CHANNEL SLOPE =  0.0139
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.459
  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"                    A       53.08      0.42     1.000    78
  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) =      28.93
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.24
  AVERAGE FLOW DEPTH(FEET) =   0.30   TRAVEL TIME(MIN.) =  22.88
  Tc(MIN.) =   27.88
  SUBAREA AREA(ACRES) =    53.08       SUBAREA RUNOFF(CFS) =   49.84
  EFFECTIVE AREA(ACRES) =     53.18     AREA-AVERAGED Fm(INCH/HR) =   0.42
  AREA-AVERAGED Fp(INCH/HR) =   0.42  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       53.2         PEAK FLOW RATE(CFS) =      49.93

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.36   FLOW VELOCITY(FEET/SEC.) =   3.82
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =    4545.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   27.88
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.459
  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"                    A       53.08      0.42     1.000    78
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   53.08      SUBAREA RUNOFF(CFS) =   49.84
  EFFECTIVE AREA(ACRES) =    106.26   AREA-AVERAGED Fm(INCH/HR) =  0.42
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  1.00
```

```
  TOTAL AREA(ACRES) =      106.3       PEAK FLOW RATE(CFS) =      99.77
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      106.3  TC(MIN.) =     27.88
  EFFECTIVE AREA(ACRES) =    106.26  AREA-AVERAGED Fm(INCH/HR)=  0.42
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =      99.77
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```



```
************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        (c) Copyright 1983-2011 Advanced Engineering Software (aes)
            Ver. 18.0  Release Date: 07/01/2011  License ID 1499

                          Analysis prepared by:
```

```
 ************************* DESCRIPTION OF STUDY *************************
* 2400 HIGHLAND                                                        *
* 25 YEAR RECURRENCE INTERVAL                                          *
* EXISTING CONDITIONS                                                  *
 ************************************************************************

  FILE NAME: CARS25E.DAT
  TIME/DATE OF STUDY: 13:40 11/16/2023
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED TABLED RAINFALL USED*
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)    5.00;  4.020
   2)   10.00;  2.880
   3)   15.00;  2.320
   4)   30.00;  1.720
   5)   60.00;  1.260
   6)  120.00;  0.878
   7)  180.00;  0.714
   8)  360.00;  0.504
   9)  720.00;  0.337
  *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 0.0312 0.167 0.0150
```

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

****************************************************************************
  FLOW PROCESS FROM NODE    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) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1371.76  DOWNSTREAM(FEET) =   1364.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.523
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.901
  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"                    A        0.10      0.42     1.000    78    5.52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.31
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.31

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1364.00  DOWNSTREAM(FEET) =   1296.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  4918.00   CHANNEL SLOPE =  0.0138
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  1.392
  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"                    A        3.72      0.42     1.000    78
  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) =       2.20
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.79
```

```
  AVERAGE FLOW DEPTH(FEET) =   0.11   TRAVEL TIME(MIN.) =  45.87
  Tc(MIN.) =   51.39
  SUBAREA AREA(ACRES) =     3.72       SUBAREA RUNOFF(CFS) =    3.27
  EFFECTIVE AREA(ACRES) =      3.82     AREA-AVERAGED Fm(INCH/HR) =   0.42
  AREA-AVERAGED Fp(INCH/HR) =   0.42  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        3.8         PEAK FLOW RATE(CFS) =       3.36

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   1.93
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =    5018.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   51.39
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  1.392
  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"                    A        3.72      0.42     1.000    78
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.72      SUBAREA RUNOFF(CFS) =    3.27
  EFFECTIVE AREA(ACRES) =      7.54   AREA-AVERAGED Fm(INCH/HR) =  0.42
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        7.5       PEAK FLOW RATE(CFS) =       6.62

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1374.12  DOWNSTREAM(FEET) =   1360.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.020
  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"                    A        0.10      0.42     1.000    78    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.32
```

```
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.32

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1360.00  DOWNSTREAM(FEET) =   1298.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  4445.00   CHANNEL SLOPE =  0.0139
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  1.890
  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"                    A       53.08      0.42     1.000    78
  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) =      39.13
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.57
  AVERAGE FLOW DEPTH(FEET) =   0.33   TRAVEL TIME(MIN.) =  20.76
  Tc(MIN.) =   25.76
  SUBAREA AREA(ACRES) =    53.08       SUBAREA RUNOFF(CFS) =   70.39
  EFFECTIVE AREA(ACRES) =     53.18     AREA-AVERAGED Fm(INCH/HR) =   0.42
  AREA-AVERAGED Fp(INCH/HR) =   0.42  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       53.2         PEAK FLOW RATE(CFS) =      70.53

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.42   FLOW VELOCITY(FEET/SEC.) =   4.10
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =    4545.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   25.76
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  1.890
  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"                    A       53.08      0.42     1.000    78
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.42
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   53.08      SUBAREA RUNOFF(CFS) =   70.39
  EFFECTIVE AREA(ACRES) =    106.26   AREA-AVERAGED Fm(INCH/HR) =  0.42
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap =  1.00
```

```
  TOTAL AREA(ACRES) =      106.3       PEAK FLOW RATE(CFS) =     140.92
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      106.3  TC(MIN.) =     25.76
  EFFECTIVE AREA(ACRES) =    106.26  AREA-AVERAGED Fm(INCH/HR)=  0.42
  AREA-AVERAGED Fp(INCH/HR) =  0.42  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =     140.92
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```



```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        (c) Copyright 1983-2011 Advanced Engineering Software (aes)
            Ver. 18.0  Release Date: 07/01/2011  License ID 1499

                          Analysis prepared by:
```

```
 ************************ DESCRIPTION OF STUDY ************************
* 2400 HIGHLAND                                                      *
* 100 YEAR RECURRENCE INTERVAL                                       *
* EXISTING CONDITIONS                                                *
 **********************************************************************

  FILE NAME: CARS100E.DAT
  TIME/DATE OF STUDY: 12:49 11/16/2023
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED TABLED RAINFALL USED*
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)    5.00;  5.240
   2)   10.00;  3.760
   3)   15.00;  3.030
   4)   30.00;  2.240
   5)   60.00;  1.650
   6)  120.00;  1.130
   7)  180.00;  0.910
   8)  360.00;  0.640
   9)  720.00;  0.420
  *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 0.0312 0.167 0.0150
```

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

****************************************************************************
  FLOW PROCESS FROM NODE    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) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1371.76  DOWNSTREAM(FEET) =   1364.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.523
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.085
  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"                    A        0.10      0.18     1.000    93    5.52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.44
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.44

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1364.00  DOWNSTREAM(FEET) =   1296.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  4918.00   CHANNEL SLOPE =  0.0138
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.921
  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"                    A        3.72      0.18     1.000    93
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.61
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.01
```

```
  AVERAGE FLOW DEPTH(FEET) =   0.13   TRAVEL TIME(MIN.) =  40.69
  Tc(MIN.) =   46.21
  SUBAREA AREA(ACRES) =     3.72       SUBAREA RUNOFF(CFS) =    5.83
  EFFECTIVE AREA(ACRES) =      3.82     AREA-AVERAGED Fm(INCH/HR) =   0.18
  AREA-AVERAGED Fp(INCH/HR) =   0.18  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =        3.8         PEAK FLOW RATE(CFS) =       5.99

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   2.22
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =    5018.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   46.21
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.921
  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"                    A        3.72      0.18     1.000    93
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =    3.72      SUBAREA RUNOFF(CFS) =    5.83
  EFFECTIVE AREA(ACRES) =      7.54   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =        7.5       PEAK FLOW RATE(CFS) =      11.82

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1374.12  DOWNSTREAM(FEET) =   1360.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.240
  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"                    A        0.10      0.18     1.000    93    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      0.46
```

```
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.46

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1360.00  DOWNSTREAM(FEET) =   1298.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  4445.00   CHANNEL SLOPE =  0.0139
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50

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

  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.563
  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"                    A       53.08      0.18     1.000    93
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      62.10
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.93
  AVERAGE FLOW DEPTH(FEET) =   0.40   TRAVEL TIME(MIN.) =  18.86
  Tc(MIN.) =   23.86
  SUBAREA AREA(ACRES) =    53.08       SUBAREA RUNOFF(CFS) =  113.86
  EFFECTIVE AREA(ACRES) =     53.18     AREA-AVERAGED Fm(INCH/HR) =   0.18
  AREA-AVERAGED Fp(INCH/HR) =   0.18  AREA-AVERAGED Ap =   1.00
  TOTAL AREA(ACRES) =       53.2         PEAK FLOW RATE(CFS) =     114.08

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.50   FLOW VELOCITY(FEET/SEC.) =   4.63
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =    4545.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   23.86
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.563
  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"                    A       53.08      0.18     1.000    93
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.18
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA AREA(ACRES) =   53.08      SUBAREA RUNOFF(CFS) =  113.86
  EFFECTIVE AREA(ACRES) =    106.26   AREA-AVERAGED Fm(INCH/HR) =  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap =  1.00
  TOTAL AREA(ACRES) =      106.3       PEAK FLOW RATE(CFS) =     227.94
================================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      106.3  TC(MIN.) =     23.86
  EFFECTIVE AREA(ACRES) =    106.26  AREA-AVERAGED Fm(INCH/HR)=  0.18
  AREA-AVERAGED Fp(INCH/HR) =  0.18  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =     227.94
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

↟

APPENDIX E

PROPOSED CONDITIONS HYDROLOGY AES RATIONAL METHOD RESULTS

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        (c) Copyright 1983-2011 Advanced Engineering Software (aes)
            Ver. 18.0  Release Date: 07/01/2011  License ID 1499

                          Analysis prepared by:



 ************************ DESCRIPTION OF STUDY ************************
* 2400 HIGHLAND                                                      *
* 2 YEAR RECURRENCE INTERVAL                                         *
* PROPOSED CONDITIONS                                                *
 **********************************************************************

  FILE NAME: CARS2P.DAT
  TIME/DATE OF STUDY: 13:43 11/16/2023
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED TABLED RAINFALL USED*
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)    5.00;  2.040
   2)   10.00;  1.460
   3)   15.00;  1.180
   4)   30.00;  0.876
   5)   60.00;  0.645
   6)  120.00;  0.466
   7)  180.00;  0.380
   8)  360.00;  0.276
   9)  720.00;  0.184
  *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 0.0312 0.167 0.0150
```

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

****************************************************************************
  FLOW PROCESS FROM NODE    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) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1371.76  DOWNSTREAM(FEET) =   1364.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.040
  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.)
  COMMERCIAL                 A        0.10      1.33     0.100    17    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.17
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.17

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1364.00  DOWNSTREAM(FEET) =   1296.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  4918.00   CHANNEL SLOPE =  0.0138
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   0.50
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.552
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        6.14      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.70
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.95
```

```
  AVERAGE FLOW DEPTH(FEET) =   0.13   TRAVEL TIME(MIN.) =  86.26
  Tc(MIN.) =   91.26
  SUBAREA AREA(ACRES) =     6.14       SUBAREA RUNOFF(CFS) =    2.74
  EFFECTIVE AREA(ACRES) =      6.24     AREA-AVERAGED Fm(INCH/HR) =   0.13
  AREA-AVERAGED Fp(INCH/HR) =   1.33  AREA-AVERAGED Ap =   0.10
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TOTAL AREA(ACRES) =        6.2         PEAK FLOW RATE(CFS) =       2.79

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   1.06
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =    5018.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   91.26
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.552
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        6.14      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  SUBAREA AREA(ACRES) =    6.14      SUBAREA RUNOFF(CFS) =    2.74
  EFFECTIVE AREA(ACRES) =     12.38   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TOTAL AREA(ACRES) =       12.4       PEAK FLOW RATE(CFS) =       5.53

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1338.05  DOWNSTREAM(FEET) =   1336.33

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.040
  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.)
```

```
  COMMERCIAL                  A        0.10      1.33     0.100    17    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.17
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.17

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1336.33  DOWNSTREAM(FEET) =   1312.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   817.00   CHANNEL SLOPE =  0.0298
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.539
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  A       12.52      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.29
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.15
  AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =   4.32
  Tc(MIN.) =    9.32
  SUBAREA AREA(ACRES) =    12.52       SUBAREA RUNOFF(CFS) =   15.84
  EFFECTIVE AREA(ACRES) =     12.62     AREA-AVERAGED Fm(INCH/HR) =   0.13
  AREA-AVERAGED Fp(INCH/HR) =   1.33  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =       12.6         PEAK FLOW RATE(CFS) =      15.97

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.21   FLOW VELOCITY(FEET/SEC.) =   3.70
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.32
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.539
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  A       12.52      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   12.52      SUBAREA RUNOFF(CFS) =   15.84
```

```
  EFFECTIVE AREA(ACRES) =     25.14   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       25.1       PEAK FLOW RATE(CFS) =      31.81

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.040
  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.)
  COMMERCIAL                 A        0.10      1.33     0.100    17    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.17
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.17

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1328.53
  CHANNEL LENGTH THRU SUBAREA(FEET) =   201.00   CHANNEL SLOPE =  0.0028
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.509
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.98      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.78
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.73
  AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   4.58
  Tc(MIN.) =    9.58
  SUBAREA AREA(ACRES) =     0.98       SUBAREA RUNOFF(CFS) =    1.21
  EFFECTIVE AREA(ACRES) =      1.08     AREA-AVERAGED Fm(INCH/HR) =   0.13
  AREA-AVERAGED Fp(INCH/HR) =   1.33  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =       1.34
```

```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   0.84
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     301.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    302.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.58
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.509
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.98      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.98      SUBAREA RUNOFF(CFS) =    1.21
  EFFECTIVE AREA(ACRES) =      2.06   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.1       PEAK FLOW RATE(CFS) =       2.55

****************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    305.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1321.02  DOWNSTREAM(FEET) =  1319.98
  FLOW LENGTH(FEET) =   208.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.75
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.55
  PIPE TRAVEL TIME(MIN.) =   0.92    Tc(MIN.) =   10.51
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    305.00 =     509.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    305.00 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.) =   10.51
  RAINFALL INTENSITY(INCH/HR) =   1.43
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33
  AREA-AVERAGED Ap =  0.10
```

```
  EFFECTIVE STREAM AREA(ACRES) =       2.06
  TOTAL STREAM AREA(ACRES) =       2.06
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.55

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    304.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.040
  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.)
  COMMERCIAL                 A        0.10      1.33     0.100    17    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.17
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.17

****************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    305.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1328.71
  CHANNEL LENGTH THRU SUBAREA(FEET) =   193.00   CHANNEL SLOPE =  0.0020
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.431
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.72      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.60
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.58
  AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   5.51
  Tc(MIN.) =   10.51
  SUBAREA AREA(ACRES) =     0.72       SUBAREA RUNOFF(CFS) =    0.84
  EFFECTIVE AREA(ACRES) =      0.82     AREA-AVERAGED Fm(INCH/HR) =   0.13
  AREA-AVERAGED Fp(INCH/HR) =   1.33  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.8         PEAK FLOW RATE(CFS) =       0.96
```

```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.12   FLOW VELOCITY(FEET/SEC.) =   0.68
  LONGEST FLOWPATH FROM NODE    303.00 TO NODE    305.00 =     293.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    305.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.51
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.431
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  A        0.72      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.72      SUBAREA RUNOFF(CFS) =    0.84
  EFFECTIVE AREA(ACRES) =      1.54   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.5       PEAK FLOW RATE(CFS) =       1.80

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    305.00 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.) =   10.51
  RAINFALL INTENSITY(INCH/HR) =   1.43
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.54
  TOTAL STREAM AREA(ACRES) =       1.54
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.80

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        2.55   10.51    1.432  1.33( 0.13) 0.10       2.1     300.00
      2        1.80   10.51    1.431  1.33( 0.13) 0.10       1.5     303.00

  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        4.35   10.51    1.432  1.33( 0.13) 0.10       3.6     300.00
      2        4.35   10.51    1.431  1.33( 0.13) 0.10       3.6     303.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       4.35    Tc(MIN.) =    10.51
  EFFECTIVE AREA(ACRES) =       3.60   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        3.6
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    305.00 =     509.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    308.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1319.98  DOWNSTREAM(FEET) =  1318.94
  FLOW LENGTH(FEET) =   208.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  12.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.14
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.35
  PIPE TRAVEL TIME(MIN.) =   0.84    Tc(MIN.) =   11.34
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    308.00 =     717.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    308.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.34
  RAINFALL INTENSITY(INCH/HR) =   1.38
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       3.60
  TOTAL STREAM AREA(ACRES) =       3.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.35

****************************************************************************
  FLOW PROCESS FROM NODE    306.00 TO NODE    307.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.040
  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.)
  COMMERCIAL                 A        0.10      1.33     0.100    17    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.17
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.17

****************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    308.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1328.18
  CHANNEL LENGTH THRU SUBAREA(FEET) =   201.00   CHANNEL SLOPE =  0.0045
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.632
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.24      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.02
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.95
  AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   3.51
  Tc(MIN.) =    8.51
  SUBAREA AREA(ACRES) =     1.24       SUBAREA RUNOFF(CFS) =    1.67
  EFFECTIVE AREA(ACRES) =      1.34     AREA-AVERAGED Fm(INCH/HR) =   0.13
  AREA-AVERAGED Fp(INCH/HR) =   1.33  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.3         PEAK FLOW RATE(CFS) =       1.81

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   1.04
  LONGEST FLOWPATH FROM NODE    306.00 TO NODE    308.00 =     301.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    308.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.51
```

```
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.632
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.24      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.24      SUBAREA RUNOFF(CFS) =    1.67
  EFFECTIVE AREA(ACRES) =      2.58   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.6       PEAK FLOW RATE(CFS) =       3.48

****************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    308.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.51
  RAINFALL INTENSITY(INCH/HR) =   1.63
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       2.58
  TOTAL STREAM AREA(ACRES) =       2.58
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.48

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        4.35   11.34    1.385  1.33( 0.13) 0.10       3.6     300.00
      1        4.35   11.35    1.384  1.33( 0.13) 0.10       3.6     303.00
      2        3.48    8.51    1.632  1.33( 0.13) 0.10       2.6     306.00

  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        7.39    8.51    1.632  1.33( 0.13) 0.10       5.3     306.00
      2        7.26   11.34    1.385  1.33( 0.13) 0.10       6.2     300.00
      3        7.26   11.35    1.384  1.33( 0.13) 0.10       6.2     303.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       7.39    Tc(MIN.) =     8.51
  EFFECTIVE AREA(ACRES) =       5.28   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
```

```
  TOTAL AREA(ACRES) =        6.2
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    308.00 =     717.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    311.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1318.94  DOWNSTREAM(FEET) =  1317.82
  FLOW LENGTH(FEET) =   224.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.88
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.39
  PIPE TRAVEL TIME(MIN.) =   0.77    Tc(MIN.) =    9.28
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    311.00 =     941.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    311.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.28
  RAINFALL INTENSITY(INCH/HR) =   1.54
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       5.28
  TOTAL STREAM AREA(ACRES) =       6.18
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.39

****************************************************************************
  FLOW PROCESS FROM NODE    309.00 TO NODE    310.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1352.60  DOWNSTREAM(FEET) =   1348.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.040
  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.)
  COMMERCIAL                 A        0.10      1.33     0.100    17    5.00
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.17
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.17

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    311.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1348.30  DOWNSTREAM(FEET) =   1328.52
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1374.00   CHANNEL SLOPE =  0.0144
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.075
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.81      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.98
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.51
  AVERAGE FLOW DEPTH(FEET) =   0.08   TRAVEL TIME(MIN.) =  15.17
  Tc(MIN.) =   20.17
  SUBAREA AREA(ACRES) =     1.81       SUBAREA RUNOFF(CFS) =    1.58
  EFFECTIVE AREA(ACRES) =      1.91     AREA-AVERAGED Fm(INCH/HR) =   0.13
  AREA-AVERAGED Fp(INCH/HR) =   1.33  AREA-AVERAGED Ap =   0.10
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TOTAL AREA(ACRES) =        1.9         PEAK FLOW RATE(CFS) =       1.66

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.10   FLOW VELOCITY(FEET/SEC.) =   1.61
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    311.00 =    1474.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    311.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   20.17
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.075
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.81      1.33     0.100    17
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  SUBAREA AREA(ACRES) =    1.81      SUBAREA RUNOFF(CFS) =    1.58
  EFFECTIVE AREA(ACRES) =      3.72   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TOTAL AREA(ACRES) =        3.7       PEAK FLOW RATE(CFS) =       3.24

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    311.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   20.17
  RAINFALL INTENSITY(INCH/HR) =   1.08
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       3.72
  TOTAL STREAM AREA(ACRES) =       3.72
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.24

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        7.39    9.28    1.544  1.33( 0.13) 0.10       5.3     306.00
      1        7.26   12.11    1.342  1.33( 0.13) 0.10       6.2     300.00
      1        7.26   12.12    1.341  1.33( 0.13) 0.10       6.2     303.00
      2        3.24   20.17    1.075  1.33( 0.13) 0.10       3.7     309.00

  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        9.56    9.28    1.544  1.33( 0.13) 0.10       7.0     306.00
      2        9.69   12.11    1.342  1.33( 0.13) 0.10       8.4     300.00
      3        9.69   12.12    1.341  1.33( 0.13) 0.10       8.4     303.00
      4        9.05   20.17    1.075  1.33( 0.13) 0.10       9.9     309.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       9.69    Tc(MIN.) =    12.11
  EFFECTIVE AREA(ACRES) =       8.41   AREA-AVERAGED Fm(INCH/HR) =  0.13
```

```
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        9.9
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    311.00 =    1474.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    314.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1317.82  DOWNSTREAM(FEET) =  1316.86
  FLOW LENGTH(FEET) =   191.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.14
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.69
  PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =   12.73
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    314.00 =    1665.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    314.00 TO NODE    314.00 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.) =   12.73
  RAINFALL INTENSITY(INCH/HR) =   1.31
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       8.41
  TOTAL STREAM AREA(ACRES) =       9.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.69

****************************************************************************
  FLOW PROCESS FROM NODE    213.00 TO NODE    313.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.040
  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.)
```

```
  COMMERCIAL                  A        0.10      1.33     0.100    17    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.17
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.17

****************************************************************************
  FLOW PROCESS FROM NODE    313.00 TO NODE    314.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1328.42
  CHANNEL LENGTH THRU SUBAREA(FEET) =   201.00   CHANNEL SLOPE =  0.0033
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.547
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  A        0.99      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.81
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.79
  AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   4.25
  Tc(MIN.) =    9.25
  SUBAREA AREA(ACRES) =     0.99       SUBAREA RUNOFF(CFS) =    1.26
  EFFECTIVE AREA(ACRES) =      1.09     AREA-AVERAGED Fm(INCH/HR) =   0.13
  AREA-AVERAGED Fp(INCH/HR) =   1.33  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =       1.39

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.12   FLOW VELOCITY(FEET/SEC.) =   0.90
  LONGEST FLOWPATH FROM NODE    213.00 TO NODE    314.00 =     301.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    314.00 TO NODE    314.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.25
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.547
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  A        0.99      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.99      SUBAREA RUNOFF(CFS) =    1.26
```

```
  EFFECTIVE AREA(ACRES) =      2.08   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.1       PEAK FLOW RATE(CFS) =       2.65

****************************************************************************
  FLOW PROCESS FROM NODE    314.00 TO NODE    314.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.25
  RAINFALL INTENSITY(INCH/HR) =   1.55
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       2.08
  TOTAL STREAM AREA(ACRES) =       2.08
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.65

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        9.56    9.90    1.472  1.33( 0.13) 0.10       7.0     306.00
      1        9.69   12.73    1.307  1.33( 0.13) 0.10       8.4     300.00
      1        9.69   12.74    1.307  1.33( 0.13) 0.10       8.4     303.00
      1        9.05   20.80    1.062  1.33( 0.13) 0.10       9.9     309.00
      2        2.65    9.25    1.547  1.33( 0.13) 0.10       2.1     213.00

  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       12.09    9.25    1.547  1.33( 0.13) 0.10       8.6     213.00
      2       12.07    9.90    1.472  1.33( 0.13) 0.10       9.1     306.00
      3       11.89   12.73    1.307  1.33( 0.13) 0.10      10.5     300.00
      4       11.89   12.74    1.307  1.33( 0.13) 0.10      10.5     303.00
      5       10.84   20.80    1.062  1.33( 0.13) 0.10      12.0     309.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      12.09    Tc(MIN.) =     9.25
  EFFECTIVE AREA(ACRES) =       8.61   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       12.0
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    314.00 =    1665.00 FEET.

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

```
  FLOW PROCESS FROM NODE    314.00 TO NODE    317.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1316.86  DOWNSTREAM(FEET) =  1315.82
  FLOW LENGTH(FEET) =   208.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.48
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.09
  PIPE TRAVEL TIME(MIN.) =   0.63    Tc(MIN.) =    9.88
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    317.00 =    1873.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    317.00 TO NODE    317.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.88
  RAINFALL INTENSITY(INCH/HR) =   1.47
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       8.61
  TOTAL STREAM AREA(ACRES) =      11.98
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      12.09

****************************************************************************
  FLOW PROCESS FROM NODE    315.00 TO NODE    316.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.040
  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.)
  COMMERCIAL                 A        0.10      1.33     0.100    17    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.17
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.17
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    316.00 TO NODE    317.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1328.42
  CHANNEL LENGTH THRU SUBAREA(FEET) =   201.00   CHANNEL SLOPE =  0.0033
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.547
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.99      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.81
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.79
  AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   4.25
  Tc(MIN.) =    9.25
  SUBAREA AREA(ACRES) =     0.99       SUBAREA RUNOFF(CFS) =    1.26
  EFFECTIVE AREA(ACRES) =      1.09     AREA-AVERAGED Fm(INCH/HR) =   0.13
  AREA-AVERAGED Fp(INCH/HR) =   1.33  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =       1.39

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.12   FLOW VELOCITY(FEET/SEC.) =   0.90
  LONGEST FLOWPATH FROM NODE    315.00 TO NODE    317.00 =     301.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    317.00 TO NODE    317.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.25
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.547
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.99      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.99      SUBAREA RUNOFF(CFS) =    1.26
  EFFECTIVE AREA(ACRES) =      2.08   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.1       PEAK FLOW RATE(CFS) =       2.65

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

```
  FLOW PROCESS FROM NODE    317.00 TO NODE    317.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.25
  RAINFALL INTENSITY(INCH/HR) =   1.55
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       2.08
  TOTAL STREAM AREA(ACRES) =       2.08
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.65

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       12.09    9.88    1.474  1.33( 0.13) 0.10       8.6     213.00
      1       12.07   10.53    1.430  1.33( 0.13) 0.10       9.1     306.00
      1       11.89   13.37    1.271  1.33( 0.13) 0.10      10.5     300.00
      1       11.89   13.38    1.271  1.33( 0.13) 0.10      10.5     303.00
      1       10.84   21.47    1.049  1.33( 0.13) 0.10      12.0     309.00
      2        2.65    9.25    1.547  1.33( 0.13) 0.10       2.1     315.00

  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       14.58    9.25    1.547  1.33( 0.13) 0.10      10.1     315.00
      2       14.60    9.88    1.474  1.33( 0.13) 0.10      10.7     213.00
      3       14.50   10.53    1.430  1.33( 0.13) 0.10      11.2     306.00
      4       14.03   13.37    1.271  1.33( 0.13) 0.10      12.6     300.00
      5       14.03   13.38    1.271  1.33( 0.13) 0.10      12.6     303.00
      6       12.61   21.47    1.049  1.33( 0.13) 0.10      14.1     309.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      14.60    Tc(MIN.) =     9.88
  EFFECTIVE AREA(ACRES) =      10.69   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       14.1
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    317.00 =    1873.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    317.00 TO NODE    320.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1315.82  DOWNSTREAM(FEET) =  1314.78
  FLOW LENGTH(FEET) =   207.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  18.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.65
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.60
  PIPE TRAVEL TIME(MIN.) =   0.61    Tc(MIN.) =   10.49
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    320.00 =    2080.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    320.00 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.) =   10.49
  RAINFALL INTENSITY(INCH/HR) =   1.43
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =      10.69
  TOTAL STREAM AREA(ACRES) =      14.06
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      14.60

****************************************************************************
  FLOW PROCESS FROM NODE    318.00 TO NODE    319.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.040
  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.)
  COMMERCIAL                 A        0.10      1.33     0.100    17    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.17
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.17

****************************************************************************
  FLOW PROCESS FROM NODE    319.00 TO NODE    320.00 IS CODE =  51
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1328.42
  CHANNEL LENGTH THRU SUBAREA(FEET) =   201.00   CHANNEL SLOPE =  0.0033
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.567
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.07      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.88
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.82
  AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   4.08
  Tc(MIN.) =    9.08
  SUBAREA AREA(ACRES) =     1.07       SUBAREA RUNOFF(CFS) =    1.38
  EFFECTIVE AREA(ACRES) =      1.17     AREA-AVERAGED Fm(INCH/HR) =   0.13
  AREA-AVERAGED Fp(INCH/HR) =   1.33  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.2         PEAK FLOW RATE(CFS) =       1.51

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   0.95
  LONGEST FLOWPATH FROM NODE    318.00 TO NODE    320.00 =     301.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    320.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.08
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.567
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.07      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.07      SUBAREA RUNOFF(CFS) =    1.38
  EFFECTIVE AREA(ACRES) =      2.24   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.2       PEAK FLOW RATE(CFS) =       2.89

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    320.00 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.) =    9.08
  RAINFALL INTENSITY(INCH/HR) =   1.57
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       2.24
  TOTAL STREAM AREA(ACRES) =       2.24
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.89

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       14.58    9.86    1.476  1.33( 0.13) 0.10      10.1     315.00
      1       14.60   10.49    1.432  1.33( 0.13) 0.10      10.7     213.00
      1       14.50   11.14    1.396  1.33( 0.13) 0.10      11.2     306.00
      1       14.03   13.98    1.237  1.33( 0.13) 0.10      12.6     300.00
      1       14.03   13.99    1.237  1.33( 0.13) 0.10      12.6     303.00
      1       12.61   22.09    1.036  1.33( 0.13) 0.10      14.1     309.00
      2        2.89    9.08    1.567  1.33( 0.13) 0.10       2.2     318.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       17.22    9.08    1.567  1.33( 0.13) 0.10      11.6     318.00
      2       17.29    9.86    1.476  1.33( 0.13) 0.10      12.4     315.00
      3       17.22   10.49    1.432  1.33( 0.13) 0.10      12.9     213.00
      4       17.05   11.14    1.396  1.33( 0.13) 0.10      13.4     306.00
      5       16.28   13.98    1.237  1.33( 0.13) 0.10      14.8     300.00
      6       16.27   13.99    1.237  1.33( 0.13) 0.10      14.8     303.00
      7       14.49   22.09    1.036  1.33( 0.13) 0.10      16.3     309.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      17.29    Tc(MIN.) =     9.86
  EFFECTIVE AREA(ACRES) =      12.38   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       16.3
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    320.00 =    2080.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    323.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1314.78  DOWNSTREAM(FEET) =  1313.87
  FLOW LENGTH(FEET) =   182.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.98
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.29
  PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =   10.37
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    323.00 =    2262.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    323.00 TO NODE    323.00 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.) =   10.37
  RAINFALL INTENSITY(INCH/HR) =   1.44
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =      12.38
  TOTAL STREAM AREA(ACRES) =      16.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      17.29

****************************************************************************
  FLOW PROCESS FROM NODE    321.00 TO NODE    322.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1349.12  DOWNSTREAM(FEET) =   1342.96

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.040
  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.)
  COMMERCIAL                 A        0.10      1.33     0.100    17    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.17
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.17

****************************************************************************
  FLOW PROCESS FROM NODE    322.00 TO NODE    323.00 IS CODE =  51
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1342.96  DOWNSTREAM(FEET) =   1328.02
  CHANNEL LENGTH THRU SUBAREA(FEET) =   452.00   CHANNEL SLOPE =  0.0331
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.570
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.14      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.94
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.86
  AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   4.05
  Tc(MIN.) =    9.05
  SUBAREA AREA(ACRES) =     1.14       SUBAREA RUNOFF(CFS) =    1.47
  EFFECTIVE AREA(ACRES) =      1.24     AREA-AVERAGED Fm(INCH/HR) =   0.13
  AREA-AVERAGED Fp(INCH/HR) =   1.33  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.2         PEAK FLOW RATE(CFS) =       1.60

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   2.15
  LONGEST FLOWPATH FROM NODE    321.00 TO NODE    323.00 =     552.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    323.00 TO NODE    323.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.05
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.570
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.14      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.14      SUBAREA RUNOFF(CFS) =    1.47
  EFFECTIVE AREA(ACRES) =      2.38   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.4       PEAK FLOW RATE(CFS) =       3.08

****************************************************************************
  FLOW PROCESS FROM NODE    323.00 TO NODE    323.00 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.) =    9.05
  RAINFALL INTENSITY(INCH/HR) =   1.57
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       2.38
  TOTAL STREAM AREA(ACRES) =       2.38
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.08

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       17.22    9.59    1.508  1.33( 0.13) 0.10      11.6     318.00
      1       17.29   10.37    1.439  1.33( 0.13) 0.10      12.4     315.00
      1       17.22   11.00    1.404  1.33( 0.13) 0.10      12.9     213.00
      1       17.05   11.65    1.367  1.33( 0.13) 0.10      13.4     306.00
      1       16.28   14.49    1.208  1.33( 0.13) 0.10      14.8     300.00
      1       16.27   14.50    1.208  1.33( 0.13) 0.10      14.8     303.00
      1       14.49   22.63    1.025  1.33( 0.13) 0.10      16.3     309.00
      2        3.08    9.05    1.570  1.33( 0.13) 0.10       2.4     321.00

  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    9.05    1.570  1.33( 0.13) 0.10      13.3     321.00
      2       20.17    9.59    1.508  1.33( 0.13) 0.10      14.0     318.00
      3       20.09   10.37    1.439  1.33( 0.13) 0.10      14.8     315.00
      4       19.94   11.00    1.404  1.33( 0.13) 0.10      15.3     213.00
      5       19.69   11.65    1.367  1.33( 0.13) 0.10      15.8     306.00
      6       18.61   14.49    1.208  1.33( 0.13) 0.10      17.2     300.00
      7       18.60   14.50    1.208  1.33( 0.13) 0.10      17.2     303.00
      8       16.46   22.63    1.025  1.33( 0.13) 0.10      18.7     309.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      20.17    Tc(MIN.) =     9.59
  EFFECTIVE AREA(ACRES) =      13.96   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       18.7
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    323.00 =    2262.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    323.00 TO NODE    326.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1313.87  DOWNSTREAM(FEET) =  1312.97
  FLOW LENGTH(FEET) =   180.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.11
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      20.17
  PIPE TRAVEL TIME(MIN.) =   0.49    Tc(MIN.) =   10.08
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    326.00 =    2442.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    326.00 TO NODE    326.00 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.) =   10.08
  RAINFALL INTENSITY(INCH/HR) =   1.46
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =      13.96
  TOTAL STREAM AREA(ACRES) =      18.68
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      20.17

****************************************************************************
  FLOW PROCESS FROM NODE    324.00 TO NODE    325.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1331.16  DOWNSTREAM(FEET) =   1328.79

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.040
  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.)
  COMMERCIAL                 A        0.10      1.33     0.100    17    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.17
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.17

****************************************************************************
  FLOW PROCESS FROM NODE    325.00 TO NODE    326.00 IS CODE =  51
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1328.79  DOWNSTREAM(FEET) =   1327.69
  CHANNEL LENGTH THRU SUBAREA(FEET) =    79.00   CHANNEL SLOPE =  0.0139
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.917
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.45      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.53
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.25
  AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   1.06
  Tc(MIN.) =    6.06
  SUBAREA AREA(ACRES) =     0.45       SUBAREA RUNOFF(CFS) =    0.72
  EFFECTIVE AREA(ACRES) =      0.55     AREA-AVERAGED Fm(INCH/HR) =   0.13
  AREA-AVERAGED Fp(INCH/HR) =   1.33  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.6          PEAK FLOW RATE(CFS) =       0.88

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.08   FLOW VELOCITY(FEET/SEC.) =   1.36
  LONGEST FLOWPATH FROM NODE    324.00 TO NODE    326.00 =     179.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    326.00 TO NODE    326.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.06
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.917
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.45      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.45      SUBAREA RUNOFF(CFS) =    0.72
  EFFECTIVE AREA(ACRES) =      1.00   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.0       PEAK FLOW RATE(CFS) =       1.61

****************************************************************************
  FLOW PROCESS FROM NODE    326.00 TO NODE    326.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

>>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<

TOTAL NUMBER OF STREAMS = 2
CONFLUENCE VALUES USED FOR INDEPENDENT STREAM 2 ARE:
TIME OF CONCENTRATION(MIN.) = 6.06
RAINFALL INTENSITY(INCH/HR) = 1.92
AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 1.33
AREA-AVERAGED Ap = 0.10
EFFECTIVE STREAM AREA(ACRES) = 1.00
TOTAL STREAM AREA(ACRES) = 1.00
PEAK FLOW RATE(CFS) AT CONFLUENCE = 1.61

** CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	20.07	9.54	1.513	1.33(0.13)	0.10	13.3	321.00
1	20.17	10.08	1.456	1.33(0.13)	0.10	14.0	318.00
1	20.09	10.86	1.412	1.33(0.13)	0.10	14.8	315.00
1	19.94	11.49	1.376	1.33(0.13)	0.10	15.3	213.00
1	19.69	12.14	1.340	1.33(0.13)	0.10	15.8	306.00
1	18.61	14.99	1.181	1.33(0.13)	0.10	17.2	300.00
1	18.60	15.00	1.180	1.33(0.13)	0.10	17.2	303.00
1	16.46	23.14	1.015	1.33(0.13)	0.10	18.7	309.00
2	1.61	6.06	1.917	1.33(0.13)	0.10	1.0	324.00

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

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	18.08	6.06	1.917	1.33(0.13)	0.10	9.4	324.00
2	21.31	9.54	1.513	1.33(0.13)	0.10	14.3	321.00
3	21.36	10.08	1.456	1.33(0.13)	0.10	15.0	318.00
4	21.24	10.86	1.412	1.33(0.13)	0.10	15.8	315.00
5	21.06	11.49	1.376	1.33(0.13)	0.10	16.3	213.00
6	20.78	12.14	1.340	1.33(0.13)	0.10	16.8	306.00
7	19.56	14.99	1.181	1.33(0.13)	0.10	18.2	300.00
8	19.56	15.00	1.180	1.33(0.13)	0.10	18.2	303.00
9	17.29	23.14	1.015	1.33(0.13)	0.10	19.7	309.00

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 21.36 Tc(MIN.) = 10.08
EFFECTIVE AREA(ACRES) = 14.96 AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 1.33 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 19.7
LONGEST FLOWPATH FROM NODE 309.00 TO NODE 326.00 = 2442.00 FEET.

****

```
  FLOW PROCESS FROM NODE    326.00 TO NODE    329.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1312.97  DOWNSTREAM(FEET) =  1311.92
  FLOW LENGTH(FEET) =   211.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  19.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.32
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.36
  PIPE TRAVEL TIME(MIN.) =   0.56    Tc(MIN.) =   10.64
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    329.00 =    2653.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    329.00 TO NODE    329.00 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.) =   10.64
  RAINFALL INTENSITY(INCH/HR) =   1.42
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =      14.96
  TOTAL STREAM AREA(ACRES) =      19.68
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      21.36

****************************************************************************
  FLOW PROCESS FROM NODE    327.00 TO NODE    328.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1329.44  DOWNSTREAM(FEET) =   1328.65

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.051
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.034
  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.)
  COMMERCIAL                 A        0.10      1.33     0.100    17    5.05
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.17
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.17
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    328.00 TO NODE    329.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1328.65  DOWNSTREAM(FEET) =   1327.48
  CHANNEL LENGTH THRU SUBAREA(FEET) =    76.00   CHANNEL SLOPE =  0.0154
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.917
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.42      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.51
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.26
  AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   1.01
  Tc(MIN.) =    6.06
  SUBAREA AREA(ACRES) =     0.42       SUBAREA RUNOFF(CFS) =    0.67
  EFFECTIVE AREA(ACRES) =      0.52     AREA-AVERAGED Fm(INCH/HR) =   0.13
  AREA-AVERAGED Fp(INCH/HR) =   1.33  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.5         PEAK FLOW RATE(CFS) =       0.84

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.08   FLOW VELOCITY(FEET/SEC.) =   1.35
  LONGEST FLOWPATH FROM NODE    327.00 TO NODE    329.00 =     176.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    329.00 TO NODE    329.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.06
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.917
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.42      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.42      SUBAREA RUNOFF(CFS) =    0.67
  EFFECTIVE AREA(ACRES) =      0.94   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.9       PEAK FLOW RATE(CFS) =       1.51

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

```
 FLOW PROCESS FROM NODE    329.00 TO NODE    329.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    6.06
 RAINFALL INTENSITY(INCH/HR) =   1.92
 AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  1.33
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.94
 TOTAL STREAM AREA(ACRES) =       0.94
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.51

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       18.08    6.64    1.850  1.33( 0.13) 0.10       9.4     324.00
     1       21.31   10.10    1.454  1.33( 0.13) 0.10      14.3     321.00
     1       21.36   10.64    1.424  1.33( 0.13) 0.10      15.0     318.00
     1       21.24   11.44    1.380  1.33( 0.13) 0.10      15.8     315.00
     1       21.06   12.07    1.344  1.33( 0.13) 0.10      16.3     213.00
     1       20.78   12.72    1.308  1.33( 0.13) 0.10      16.8     306.00
     1       19.56   15.57    1.168  1.33( 0.13) 0.10      18.2     300.00
     1       19.56   15.58    1.168  1.33( 0.13) 0.10      18.2     303.00
     1       17.29   23.73    1.003  1.33( 0.13) 0.10      19.7     309.00
     2        1.51    6.06    1.917  1.33( 0.13) 0.10       0.9     327.00

 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       18.65    6.06    1.917  1.33( 0.13) 0.10       9.6     327.00
     2       19.53    6.64    1.850  1.33( 0.13) 0.10      10.4     324.00
     3       22.43   10.10    1.454  1.33( 0.13) 0.10      15.3     321.00
     4       22.45   10.64    1.424  1.33( 0.13) 0.10      15.9     318.00
     5       22.29   11.44    1.380  1.33( 0.13) 0.10      16.7     315.00
     6       22.08   12.07    1.344  1.33( 0.13) 0.10      17.3     213.00
     7       21.77   12.72    1.308  1.33( 0.13) 0.10      17.7     306.00
     8       20.45   15.57    1.168  1.33( 0.13) 0.10      19.1     300.00
     9       20.45   15.58    1.168  1.33( 0.13) 0.10      19.1     303.00
    10       18.05   23.73    1.003  1.33( 0.13) 0.10      20.6     309.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      22.45    Tc(MIN.) =    10.64
 EFFECTIVE AREA(ACRES) =      15.90   AREA-AVERAGED Fm(INCH/HR) =  0.13
```

```
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       20.6
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    329.00 =    2653.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    329.00 TO NODE    336.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1311.92  DOWNSTREAM(FEET) =  1310.58
  FLOW LENGTH(FEET) =   272.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.35
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      22.45
  PIPE TRAVEL TIME(MIN.) =   0.71    Tc(MIN.) =   11.35
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    336.00 =    2925.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    330.00 TO NODE    331.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1358.55  DOWNSTREAM(FEET) =   1354.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.040
  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.)
  COMMERCIAL                 A        0.10      1.33     0.100    17    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.17
```

```
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.17

****************************************************************************
  FLOW PROCESS FROM NODE    331.00 TO NODE    332.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1354.80  DOWNSTREAM(FEET) =   1335.24
  CHANNEL LENGTH THRU SUBAREA(FEET) =   735.00   CHANNEL SLOPE =  0.0266
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *   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
  COMMERCIAL                 A        1.86      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.23
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.89
  AVERAGE FLOW DEPTH(FEET) =   0.08   TRAVEL TIME(MIN.) =   6.48
  Tc(MIN.) =   11.48
  SUBAREA AREA(ACRES) =     1.86       SUBAREA RUNOFF(CFS) =    2.08
  EFFECTIVE AREA(ACRES) =      1.96     AREA-AVERAGED Fm(INCH/HR) =   0.13
  AREA-AVERAGED Fp(INCH/HR) =   1.33  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        2.0         PEAK FLOW RATE(CFS) =       2.20

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.10   FLOW VELOCITY(FEET/SEC.) =   2.13
  LONGEST FLOWPATH FROM NODE    330.00 TO NODE    332.00 =     835.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    332.00 TO NODE    332.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.48
  *   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
  COMMERCIAL                 A        1.86      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.86      SUBAREA RUNOFF(CFS) =    2.08
  EFFECTIVE AREA(ACRES) =      3.82   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        3.8       PEAK FLOW RATE(CFS) =       4.28
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    332.00 TO NODE    335.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1331.29  DOWNSTREAM(FEET) =  1314.57
  FLOW LENGTH(FEET) =   525.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.51
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.28
  PIPE TRAVEL TIME(MIN.) =   1.03    Tc(MIN.) =   12.51
  LONGEST FLOWPATH FROM NODE    330.00 TO NODE    335.00 =    1360.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    335.00 TO NODE    335.00 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.) =   12.51
  RAINFALL INTENSITY(INCH/HR) =   1.32
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       3.82
  TOTAL STREAM AREA(ACRES) =       3.82
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.28

****************************************************************************
  FLOW PROCESS FROM NODE    333.00 TO NODE    334.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1344.12  DOWNSTREAM(FEET) =   1340.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.040
  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.)
  COMMERCIAL                 A        0.10      1.33     0.100    17    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.17
```

```
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.17

****************************************************************************
  FLOW PROCESS FROM NODE    334.00 TO NODE    335.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1340.80  DOWNSTREAM(FEET) =   1326.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   773.00   CHANNEL SLOPE =  0.0185
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.325
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        2.46      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.53
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.74
  AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   7.41
  Tc(MIN.) =   12.41
  SUBAREA AREA(ACRES) =     2.46       SUBAREA RUNOFF(CFS) =    2.64
  EFFECTIVE AREA(ACRES) =      2.56     AREA-AVERAGED Fm(INCH/HR) =   0.13
  AREA-AVERAGED Fp(INCH/HR) =   1.33  AREA-AVERAGED Ap =   0.10
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TOTAL AREA(ACRES) =        2.6         PEAK FLOW RATE(CFS) =       2.75

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.12   FLOW VELOCITY(FEET/SEC.) =   2.02
  LONGEST FLOWPATH FROM NODE    333.00 TO NODE    335.00 =     873.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    335.00 TO NODE    335.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.41
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.325
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        2.46      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
```

```
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  SUBAREA AREA(ACRES) =    2.46      SUBAREA RUNOFF(CFS) =    2.64
  EFFECTIVE AREA(ACRES) =      5.02   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TOTAL AREA(ACRES) =        5.0       PEAK FLOW RATE(CFS) =       5.39

****************************************************************************
  FLOW PROCESS FROM NODE    335.00 TO NODE    335.00 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.) =   12.41
  RAINFALL INTENSITY(INCH/HR) =   1.33
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       5.02
  TOTAL STREAM AREA(ACRES) =       5.02
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.39

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        4.28   12.51    1.320  1.33( 0.13) 0.10       3.8     330.00
      2        5.39   12.41    1.325  1.33( 0.13) 0.10       5.0     333.00

  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        9.65   12.41    1.325  1.33( 0.13) 0.10       8.8     333.00
      2        9.64   12.51    1.320  1.33( 0.13) 0.10       8.8     330.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       9.65    Tc(MIN.) =    12.41
  EFFECTIVE AREA(ACRES) =       8.81   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        8.8
  LONGEST FLOWPATH FROM NODE    330.00 TO NODE    335.00 =    1360.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    335.00 TO NODE    336.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1314.57  DOWNSTREAM(FEET) =  1310.58
  FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  10.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.30
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.65
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   12.61
  LONGEST FLOWPATH FROM NODE    330.00 TO NODE    336.00 =    1485.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 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        9.65   12.61    1.314  1.33( 0.13) 0.10       8.8     333.00
      2        9.64   12.71    1.308  1.33( 0.13) 0.10       8.8     330.00
  LONGEST FLOWPATH FROM NODE    330.00 TO NODE    336.00 =    1485.00 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       18.65    6.81    1.830  1.33( 0.13) 0.10       9.6     327.00
      2       19.53    7.39    1.763  1.33( 0.13) 0.10      10.4     324.00
      3       22.43   10.81    1.414  1.33( 0.13) 0.10      15.3     321.00
      4       22.45   11.35    1.384  1.33( 0.13) 0.10      15.9     318.00
      5       22.29   12.15    1.340  1.33( 0.13) 0.10      16.7     315.00
      6       22.08   12.79    1.304  1.33( 0.13) 0.10      17.3     213.00
      7       21.77   13.44    1.267  1.33( 0.13) 0.10      17.7     306.00
      8       20.45   16.31    1.153  1.33( 0.13) 0.10      19.1     300.00
      9       20.45   16.32    1.153  1.33( 0.13) 0.10      19.1     303.00
     10       18.05   24.48    0.988  1.33( 0.13) 0.10      20.6     309.00
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    336.00 =    2925.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       26.13    6.81    1.830  1.33( 0.13) 0.10      14.3     327.00
      2       27.33    7.39    1.763  1.33( 0.13) 0.10      15.6     324.00
      3       31.40   10.81    1.414  1.33( 0.13) 0.10      22.8     321.00
      4       31.64   11.35    1.384  1.33( 0.13) 0.10      23.8     318.00
      5       31.78   12.15    1.340  1.33( 0.13) 0.10      25.2     315.00
      6       31.79   12.61    1.314  1.33( 0.13) 0.10      25.9     333.00
      7       31.75   12.71    1.308  1.33( 0.13) 0.10      26.0     330.00
```

```
      8       31.70   12.79    1.304  1.33( 0.13) 0.10      26.1     213.00
      9       31.12   13.44    1.267  1.33( 0.13) 0.10      26.6     306.00
     10       28.95   16.31    1.153  1.33( 0.13) 0.10      28.0     300.00
     11       28.95   16.32    1.153  1.33( 0.13) 0.10      28.0     303.00
     12       25.33   24.48    0.988  1.33( 0.13) 0.10      29.5     309.00
    TOTAL AREA(ACRES) =        29.5

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       31.79  Tc(MIN.) =   12.613
  EFFECTIVE AREA(ACRES) =     25.91  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       29.5
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    336.00 =    2925.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    340.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1310.58  DOWNSTREAM(FEET) =  1308.10
  FLOW LENGTH(FEET) =   685.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.17
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      31.79
  PIPE TRAVEL TIME(MIN.) =   1.85    Tc(MIN.) =   14.46
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    340.00 =    3610.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    337.00 TO NODE    338.00 IS CODE =  21
----------------------------------------------------------------------------
```

```
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1327.94

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.040
  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.)
  COMMERCIAL                 A        0.10      1.33     0.100    17    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.17
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.17

********************************************************************************
  FLOW PROCESS FROM NODE    338.00 TO NODE    339.00 IS CODE =  51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1327.94  DOWNSTREAM(FEET) =   1321.77
  CHANNEL LENGTH THRU SUBAREA(FEET) =   576.00   CHANNEL SLOPE =  0.0107
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.318
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.69      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.12
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.27
  AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   7.54
  Tc(MIN.) =   12.54
  SUBAREA AREA(ACRES) =     1.69       SUBAREA RUNOFF(CFS) =    1.80
  EFFECTIVE AREA(ACRES) =      1.79     AREA-AVERAGED Fm(INCH/HR) =   0.13
  AREA-AVERAGED Fp(INCH/HR) =   1.33  AREA-AVERAGED Ap =   0.10
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TOTAL AREA(ACRES) =        1.8         PEAK FLOW RATE(CFS) =       1.91

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.11   FLOW VELOCITY(FEET/SEC.) =   1.55
```

```
 LONGEST FLOWPATH FROM NODE    337.00 TO NODE    339.00 =     676.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    339.00 TO NODE    339.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   12.54
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.318
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        1.69      1.33     0.100    17
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
 * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
 SUBAREA AREA(ACRES) =    1.69      SUBAREA RUNOFF(CFS) =    1.80
 EFFECTIVE AREA(ACRES) =      3.48   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
 * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
 * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
 TOTAL AREA(ACRES) =        3.5       PEAK FLOW RATE(CFS) =       3.72

****************************************************************************
 FLOW PROCESS FROM NODE    339.00 TO NODE    340.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1317.75  DOWNSTREAM(FEET) =  1308.10
 FLOW LENGTH(FEET) =   304.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.23
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       3.72
 PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =   13.15
 LONGEST FLOWPATH FROM NODE    337.00 TO NODE    340.00 =     980.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 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        3.72   13.15    1.284  1.33( 0.13) 0.10       3.5     337.00
 LONGEST FLOWPATH FROM NODE    337.00 TO NODE    340.00 =     980.00 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       26.13    8.76    1.604  1.33( 0.13) 0.10      14.3     327.00
     2       27.33    9.33    1.538  1.33( 0.13) 0.10      15.6     324.00
     3       31.40   12.67    1.311  1.33( 0.13) 0.10      22.8     321.00
     4       31.64   13.20    1.281  1.33( 0.13) 0.10      23.8     318.00
     5       31.78   14.00    1.236  1.33( 0.13) 0.10      25.2     315.00
     6       31.79   14.46    1.210  1.33( 0.13) 0.10      25.9     333.00
     7       31.75   14.56    1.205  1.33( 0.13) 0.10      26.0     330.00
     8       31.70   14.64    1.200  1.33( 0.13) 0.10      26.1     213.00
     9       31.12   15.30    1.174  1.33( 0.13) 0.10      26.6     306.00
    10       28.95   18.24    1.114  1.33( 0.13) 0.10      28.0     300.00
    11       28.95   18.25    1.114  1.33( 0.13) 0.10      28.0     303.00
    12       25.33   26.44    0.948  1.33( 0.13) 0.10      29.5     309.00
 LONGEST FLOWPATH FROM NODE    309.00 TO NODE    340.00 =    3610.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       29.28    8.76    1.604  1.33( 0.13) 0.10      16.6     327.00
     2       30.53    9.33    1.538  1.33( 0.13) 0.10      18.0     324.00
     3       35.06   12.67    1.311  1.33( 0.13) 0.10      26.2     321.00
     4       35.34   13.15    1.284  1.33( 0.13) 0.10      27.2     337.00
     5       35.35   13.20    1.281  1.33( 0.13) 0.10      27.3     318.00
     6       35.36   14.00    1.236  1.33( 0.13) 0.10      28.7     315.00
     7       35.29   14.46    1.210  1.33( 0.13) 0.10      29.4     333.00
     8       35.24   14.56    1.205  1.33( 0.13) 0.10      29.5     330.00
     9       35.17   14.64    1.200  1.33( 0.13) 0.10      29.6     213.00
    10       34.51   15.30    1.174  1.33( 0.13) 0.10      30.0     306.00
    11       32.18   18.24    1.114  1.33( 0.13) 0.10      31.5     300.00
    12       32.17   18.25    1.114  1.33( 0.13) 0.10      31.5     303.00
    13       28.08   26.44    0.948  1.33( 0.13) 0.10      32.9     309.00
   TOTAL AREA(ACRES) =        32.9

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       35.36  Tc(MIN.) =   14.003
 EFFECTIVE AREA(ACRES) =     28.67  AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =       32.9
 LONGEST FLOWPATH FROM NODE    309.00 TO NODE    340.00 =    3610.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

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

```
 FLOW PROCESS FROM NODE    340.00 TO NODE    343.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1308.10  DOWNSTREAM(FEET) =  1305.41
 FLOW LENGTH(FEET) =   447.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  24.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.60
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      35.36
 PIPE TRAVEL TIME(MIN.) =   0.98    Tc(MIN.) =   14.98
 LONGEST FLOWPATH FROM NODE    309.00 TO NODE    343.00 =    4057.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    343.00 TO NODE    343.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    343.00 TO NODE    343.00 IS CODE =  13
----------------------------------------------------------------------------
 >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    341.00 TO NODE    342.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.040
 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.)
 COMMERCIAL                 A        0.10      1.33     0.100    17    5.00
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      0.17
 TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.17

****************************************************************************
 FLOW PROCESS FROM NODE    342.00 TO NODE    343.00 IS CODE =  51
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1305.41
  CHANNEL LENGTH THRU SUBAREA(FEET) =   727.00   CHANNEL SLOPE =  0.0326
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.547
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        7.39      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.96
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.85
  AVERAGE FLOW DEPTH(FEET) =   0.13   TRAVEL TIME(MIN.) =   4.25
  Tc(MIN.) =    9.25
  SUBAREA AREA(ACRES) =     7.39       SUBAREA RUNOFF(CFS) =    9.41
  EFFECTIVE AREA(ACRES) =      7.49     AREA-AVERAGED Fm(INCH/HR) =   0.13
  AREA-AVERAGED Fp(INCH/HR) =   1.33  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        7.5          PEAK FLOW RATE(CFS) =       9.53

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   3.54
  LONGEST FLOWPATH FROM NODE    341.00 TO NODE    343.00 =     827.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    343.00 TO NODE    343.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.25
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.547
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        7.39      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    7.39      SUBAREA RUNOFF(CFS) =    9.41
  EFFECTIVE AREA(ACRES) =     14.88   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       14.9       PEAK FLOW RATE(CFS) =      18.94

****************************************************************************
  FLOW PROCESS FROM NODE    343.00 TO NODE    343.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================
```

** MAIN STREAM CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	18.94	9.25	1.547	1.33(0.13)	0.10	14.9	341.00

LONGEST FLOWPATH FROM NODE 341.00 TO NODE 343.00 = 827.00 FEET.

** MEMORY BANK # 1 CONFLUENCE DATA **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	29.28	9.80	1.483	1.33(0.13)	0.10	16.6	327.00
2	30.53	10.36	1.440	1.33(0.13)	0.10	18.0	324.00
3	35.06	13.65	1.256	1.33(0.13)	0.10	26.2	321.00
4	35.34	14.13	1.229	1.33(0.13)	0.10	27.2	337.00
5	35.35	14.18	1.226	1.33(0.13)	0.10	27.3	318.00
6	35.36	14.98	1.181	1.33(0.13)	0.10	28.7	315.00
7	35.29	15.44	1.171	1.33(0.13)	0.10	29.4	333.00
8	35.24	15.54	1.169	1.33(0.13)	0.10	29.5	330.00
9	35.17	15.62	1.167	1.33(0.13)	0.10	29.6	213.00
10	34.51	16.28	1.154	1.33(0.13)	0.10	30.0	306.00
11	32.18	19.23	1.094	1.33(0.13)	0.10	31.5	300.00
12	32.17	19.24	1.094	1.33(0.13)	0.10	31.5	303.00
13	28.08	27.48	0.927	1.33(0.13)	0.10	32.9	309.00

LONGEST FLOWPATH FROM NODE 309.00 TO NODE 343.00 = 4057.00 FEET.

** PEAK FLOW RATE TABLE **

STREAM NUMBER	Q (CFS)	Tc (MIN.)	Intensity (INCH/HR)	Fp(Fm) (INCH/HR)	Ap	Ae (ACRES)	HEADWATER NODE
1	47.89	9.25	1.547	1.33(0.13)	0.10	30.6	341.00
2	47.37	9.80	1.483	1.33(0.13)	0.10	31.5	327.00
3	48.03	10.36	1.440	1.33(0.13)	0.10	32.9	324.00
4	50.19	13.65	1.256	1.33(0.13)	0.10	41.0	321.00
5	50.14	14.13	1.229	1.33(0.13)	0.10	42.1	337.00
6	50.12	14.18	1.226	1.33(0.13)	0.10	42.2	318.00
7	49.59	14.98	1.181	1.33(0.13)	0.10	43.6	315.00
8	49.41	15.44	1.171	1.33(0.13)	0.10	44.3	333.00
9	49.33	15.54	1.169	1.33(0.13)	0.10	44.4	330.00
10	49.24	15.62	1.167	1.33(0.13)	0.10	44.5	213.00
11	48.42	16.28	1.154	1.33(0.13)	0.10	44.9	306.00
12	45.37	19.23	1.094	1.33(0.13)	0.10	46.3	300.00
13	45.36	19.24	1.094	1.33(0.13)	0.10	46.3	303.00
14	39.25	27.48	0.927	1.33(0.13)	0.10	47.8	309.00

TOTAL AREA(ACRES) = 47.8

COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
PEAK FLOW RATE(CFS) = 50.19 Tc(MIN.) = 13.650
EFFECTIVE AREA(ACRES) = 41.04 AREA-AVERAGED Fm(INCH/HR) = 0.13
AREA-AVERAGED Fp(INCH/HR) = 1.33 AREA-AVERAGED Ap = 0.10
TOTAL AREA(ACRES) = 47.8
LONGEST FLOWPATH FROM NODE 309.00 TO NODE 343.00 = 4057.00 FEET.

```
****************************************************************************
  FLOW PROCESS FROM NODE    343.00 TO NODE    343.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    401.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1331.99  DOWNSTREAM(FEET) =   1330.99

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.040
  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.)
  COMMERCIAL                 A        0.10      1.33     0.100    17    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.17
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.17

****************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    402.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1330.99  DOWNSTREAM(FEET) =   1325.67
  CHANNEL LENGTH THRU SUBAREA(FEET) =   612.00   CHANNEL SLOPE =  0.0087
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.302
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        2.28      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.40
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.30
  AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   7.82
```

```
  Tc(MIN.) =   12.82
  SUBAREA AREA(ACRES) =     2.28       SUBAREA RUNOFF(CFS) =    2.40
  EFFECTIVE AREA(ACRES) =      2.38     AREA-AVERAGED Fm(INCH/HR) =   0.13
  AREA-AVERAGED Fp(INCH/HR) =   1.33  AREA-AVERAGED Ap =   0.10
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TOTAL AREA(ACRES) =        2.4         PEAK FLOW RATE(CFS) =       2.51

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   1.44
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    402.00 =     712.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    402.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   12.82
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.302
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        2.28      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  SUBAREA AREA(ACRES) =    2.28      SUBAREA RUNOFF(CFS) =    2.40
  EFFECTIVE AREA(ACRES) =      4.66   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TOTAL AREA(ACRES) =        4.7       PEAK FLOW RATE(CFS) =       4.91

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    406.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1322.57  DOWNSTREAM(FEET) =  1310.63
  FLOW LENGTH(FEET) =    22.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   3.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  25.13
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.91
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   12.83
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    406.00 =     734.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    406.00 TO NODE    406.00 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.) =   12.83
  RAINFALL INTENSITY(INCH/HR) =   1.30
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       4.66
  TOTAL STREAM AREA(ACRES) =       4.66
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.91

****************************************************************************
  FLOW PROCESS FROM NODE    403.00 TO NODE    404.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1333.09  DOWNSTREAM(FEET) =   1327.13

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.040
  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.)
  COMMERCIAL                 A        0.10      1.33     0.100    17    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.17
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.17

****************************************************************************
  FLOW PROCESS FROM NODE    404.00 TO NODE    405.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1327.13  DOWNSTREAM(FEET) =   1314.38
  CHANNEL LENGTH THRU SUBAREA(FEET) =   506.00   CHANNEL SLOPE =  0.0252
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.393
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```

```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                A        0.43      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.43
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.36
  AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   6.20
  Tc(MIN.) =   11.20
  SUBAREA AREA(ACRES) =     0.43       SUBAREA RUNOFF(CFS) =    0.49
  EFFECTIVE AREA(ACRES) =      0.53     AREA-AVERAGED Fm(INCH/HR) =   0.13
  AREA-AVERAGED Fp(INCH/HR) =   1.33  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.5         PEAK FLOW RATE(CFS) =       0.60

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   1.49
  LONGEST FLOWPATH FROM NODE    403.00 TO NODE    405.00 =     606.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    405.00 TO NODE    405.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.20
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.393
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                A        0.43      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.43      SUBAREA RUNOFF(CFS) =    0.49
  EFFECTIVE AREA(ACRES) =      0.96   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.0       PEAK FLOW RATE(CFS) =       1.09

****************************************************************************
  FLOW PROCESS FROM NODE    405.00 TO NODE    406.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1310.90  DOWNSTREAM(FEET) =  1310.63
  FLOW LENGTH(FEET) =    54.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   5.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.03
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.09
  PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   11.50
  LONGEST FLOWPATH FROM NODE    403.00 TO NODE    406.00 =     660.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    406.00 TO NODE    406.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.50
  RAINFALL INTENSITY(INCH/HR) =   1.38
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.96
  TOTAL STREAM AREA(ACRES) =       0.96
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.09

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        4.91   12.83    1.301  1.33( 0.13) 0.10       4.7     400.00
      2        1.09   11.50    1.376  1.33( 0.13) 0.10       1.0     403.00

  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        5.76   11.50    1.376  1.33( 0.13) 0.10       5.1     403.00
      2        5.94   12.83    1.301  1.33( 0.13) 0.10       5.6     400.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.94    Tc(MIN.) =    12.83
  EFFECTIVE AREA(ACRES) =       5.62   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        5.6
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    406.00 =     734.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    406.00 TO NODE    410.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1310.63  DOWNSTREAM(FEET) =  1309.86
  FLOW LENGTH(FEET) =   154.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.57
```

```
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.94
  PIPE TRAVEL TIME(MIN.) =   0.56    Tc(MIN.) =   13.40
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    410.00 =     888.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.40
  RAINFALL INTENSITY(INCH/HR) =   1.27
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       5.62
  TOTAL STREAM AREA(ACRES) =       5.62
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.94

****************************************************************************
  FLOW PROCESS FROM NODE    407.00 TO NODE    408.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1333.09  DOWNSTREAM(FEET) =   1329.82

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.040
  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.)
  COMMERCIAL                 A        0.10      1.33     0.100    17    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.17
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.17

****************************************************************************
  FLOW PROCESS FROM NODE    408.00 TO NODE    409.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.82  DOWNSTREAM(FEET) =   1325.77
  CHANNEL LENGTH THRU SUBAREA(FEET) =    84.00   CHANNEL SLOPE =  0.0482
```

```
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.943
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.13      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.28
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.67
  AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =   0.84
  Tc(MIN.) =    5.84
  SUBAREA AREA(ACRES) =     0.13       SUBAREA RUNOFF(CFS) =    0.21
  EFFECTIVE AREA(ACRES) =      0.23     AREA-AVERAGED Fm(INCH/HR) =   0.13
  AREA-AVERAGED Fp(INCH/HR) =   1.33  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.2         PEAK FLOW RATE(CFS) =       0.37

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.05   FLOW VELOCITY(FEET/SEC.) =   1.60
  LONGEST FLOWPATH FROM NODE    407.00 TO NODE    409.00 =     184.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    409.00 TO NODE    409.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.84
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.943
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.13      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.13      SUBAREA RUNOFF(CFS) =    0.21
  EFFECTIVE AREA(ACRES) =      0.36   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.4       PEAK FLOW RATE(CFS) =       0.59

****************************************************************************
  FLOW PROCESS FROM NODE    409.00 TO NODE    410.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1322.82  DOWNSTREAM(FEET) =  1309.86
  FLOW LENGTH(FEET) =    22.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   1.2 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.80
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.59
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    5.87
  LONGEST FLOWPATH FROM NODE    407.00 TO NODE    410.00 =     206.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.87
  RAINFALL INTENSITY(INCH/HR) =   1.94
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.36
  TOTAL STREAM AREA(ACRES) =       0.36
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.59

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        5.76   12.07    1.344  1.33( 0.13) 0.10       5.1     403.00
      1        5.94   13.40    1.270  1.33( 0.13) 0.10       5.6     400.00
      2        0.59    5.87    1.940  1.33( 0.13) 0.10       0.4     407.00

  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        4.77    5.87    1.940  1.33( 0.13) 0.10       2.9     407.00
      2        6.16   12.07    1.344  1.33( 0.13) 0.10       5.5     403.00
      3        6.31   13.40    1.270  1.33( 0.13) 0.10       6.0     400.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       6.31    Tc(MIN.) =    13.40
  EFFECTIVE AREA(ACRES) =       5.98   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        6.0
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    410.00 =     888.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    424.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1309.86  DOWNSTREAM(FEET) =  1309.34
  FLOW LENGTH(FEET) =   103.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.64
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.31
  PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =   13.77
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    424.00 =     991.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    424.00 TO NODE    424.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    424.00 TO NODE    424.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    411.00 TO NODE    412.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.040
  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.)
  COMMERCIAL                 A        0.10      1.33     0.100    17    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.17
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.17

****************************************************************************
  FLOW PROCESS FROM NODE    412.00 TO NODE    413.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1328.53
  CHANNEL LENGTH THRU SUBAREA(FEET) =   202.00   CHANNEL SLOPE =  0.0028
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.511
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.99      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.79
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.74
  AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   4.56
  Tc(MIN.) =    9.56
  SUBAREA AREA(ACRES) =     0.99       SUBAREA RUNOFF(CFS) =    1.23
  EFFECTIVE AREA(ACRES) =      1.09     AREA-AVERAGED Fm(INCH/HR) =   0.13
  AREA-AVERAGED Fp(INCH/HR) =   1.33  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =       1.35

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   0.85
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    413.00 =     302.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    413.00 TO NODE    413.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.56
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.511
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.99      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.99      SUBAREA RUNOFF(CFS) =    1.23
  EFFECTIVE AREA(ACRES) =      2.08   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.1       PEAK FLOW RATE(CFS) =       2.58

****************************************************************************
  FLOW PROCESS FROM NODE    413.00 TO NODE    416.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1323.25  DOWNSTREAM(FEET) =  1321.34
```

```
  FLOW LENGTH(FEET) =   208.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.68
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.58
  PIPE TRAVEL TIME(MIN.) =   0.74    Tc(MIN.) =   10.30
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    416.00 =     510.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    416.00 TO NODE    416.00 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.) =   10.30
  RAINFALL INTENSITY(INCH/HR) =   1.44
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       2.08
  TOTAL STREAM AREA(ACRES) =       2.08
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.58

****************************************************************************
  FLOW PROCESS FROM NODE    414.00 TO NODE    415.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.040
  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.)
  COMMERCIAL                 A        0.10      1.33     0.100    17    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.17
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.17

****************************************************************************
  FLOW PROCESS FROM NODE    415.00 TO NODE    416.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1328.53
  CHANNEL LENGTH THRU SUBAREA(FEET) =   203.00   CHANNEL SLOPE =  0.0028
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *   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
  COMMERCIAL                 A        0.99      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.79
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.74
  AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   4.59
  Tc(MIN.) =    9.59
  SUBAREA AREA(ACRES) =     0.99       SUBAREA RUNOFF(CFS) =    1.22
  EFFECTIVE AREA(ACRES) =      1.09     AREA-AVERAGED Fm(INCH/HR) =   0.13
  AREA-AVERAGED Fp(INCH/HR) =   1.33  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =       1.35

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   0.85
  LONGEST FLOWPATH FROM NODE    414.00 TO NODE    416.00 =     303.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    416.00 TO NODE    416.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.59
  *   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
  COMMERCIAL                 A        0.99      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.99      SUBAREA RUNOFF(CFS) =    1.22
  EFFECTIVE AREA(ACRES) =      2.08   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.1       PEAK FLOW RATE(CFS) =       2.57

****************************************************************************
  FLOW PROCESS FROM NODE    416.00 TO NODE    416.00 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.) =    9.59
  RAINFALL INTENSITY(INCH/HR) =   1.51
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       2.08
  TOTAL STREAM AREA(ACRES) =       2.08
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.57

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        2.58   10.30    1.443  1.33( 0.13) 0.10       2.1     411.00
      2        2.57    9.59    1.507  1.33( 0.13) 0.10       2.1     414.00

  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        5.09    9.59    1.507  1.33( 0.13) 0.10       4.0     414.00
      2        5.03   10.30    1.443  1.33( 0.13) 0.10       4.2     411.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.09    Tc(MIN.) =     9.59
  EFFECTIVE AREA(ACRES) =       4.02   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        4.2
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    416.00 =     510.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    416.00 TO NODE    419.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1321.34  DOWNSTREAM(FEET) =  1319.26
  FLOW LENGTH(FEET) =   209.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  10.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.70
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.09
  PIPE TRAVEL TIME(MIN.) =   0.61    Tc(MIN.) =   10.20
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    419.00 =     719.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    419.00 TO NODE    419.00 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.) =   10.20
  RAINFALL INTENSITY(INCH/HR) =   1.45
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       4.02
  TOTAL STREAM AREA(ACRES) =       4.16
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.09

****************************************************************************
  FLOW PROCESS FROM NODE    417.00 TO NODE    418.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.040
  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.)
  COMMERCIAL                 A        0.10      1.33     0.100    17    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.17
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.17

****************************************************************************
  FLOW PROCESS FROM NODE    418.00 TO NODE    419.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1328.53
  CHANNEL LENGTH THRU SUBAREA(FEET) =   193.00   CHANNEL SLOPE =  0.0029
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.548
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.83      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.70
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.76
  AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   4.24
  Tc(MIN.) =    9.24
  SUBAREA AREA(ACRES) =     0.83       SUBAREA RUNOFF(CFS) =    1.06
  EFFECTIVE AREA(ACRES) =      0.93     AREA-AVERAGED Fm(INCH/HR) =   0.13
  AREA-AVERAGED Fp(INCH/HR) =   1.33  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.9          PEAK FLOW RATE(CFS) =       1.18

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.12   FLOW VELOCITY(FEET/SEC.) =   0.84
  LONGEST FLOWPATH FROM NODE    417.00 TO NODE    419.00 =     293.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    419.00 TO NODE    419.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.24
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.548
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.83      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.83      SUBAREA RUNOFF(CFS) =    1.06
  EFFECTIVE AREA(ACRES) =      1.76   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.8       PEAK FLOW RATE(CFS) =       2.24

****************************************************************************
  FLOW PROCESS FROM NODE    419.00 TO NODE    419.00 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.) =    9.24
  RAINFALL INTENSITY(INCH/HR) =   1.55
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.76
  TOTAL STREAM AREA(ACRES) =       1.76
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.24

  ** CONFLUENCE DATA **
```

```
 STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
 NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
    1        5.09   10.20    1.449  1.33( 0.13) 0.10       4.0     414.00
    1        5.03   10.92    1.409  1.33( 0.13) 0.10       4.2     411.00
    2        2.24    9.24    1.548  1.33( 0.13) 0.10       1.8     417.00

  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        7.20    9.24    1.548  1.33( 0.13) 0.10       5.4     417.00
    2        7.18   10.20    1.449  1.33( 0.13) 0.10       5.8     414.00
    3        7.05   10.92    1.409  1.33( 0.13) 0.10       5.9     411.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       7.20    Tc(MIN.) =     9.24
  EFFECTIVE AREA(ACRES) =       5.40   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        5.9
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    419.00 =     719.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    419.00 TO NODE    423.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1319.26  DOWNSTREAM(FEET) =  1310.69
  FLOW LENGTH(FEET) =   607.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  11.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.94
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.20
  PIPE TRAVEL TIME(MIN.) =   1.46    Tc(MIN.) =   10.70
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    423.00 =    1326.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    423.00 TO NODE    423.00 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.) =   10.70
  RAINFALL INTENSITY(INCH/HR) =   1.42
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33
  AREA-AVERAGED Ap =  0.10
```

```
  EFFECTIVE STREAM AREA(ACRES) =       5.40
  TOTAL STREAM AREA(ACRES) =       5.92
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.20

****************************************************************************
  FLOW PROCESS FROM NODE    420.00 TO NODE    421.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1333.33  DOWNSTREAM(FEET) =   1330.07

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.040
  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.)
  COMMERCIAL                 A        0.10      1.33     0.100    17    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.17
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.17

****************************************************************************
  FLOW PROCESS FROM NODE    421.00 TO NODE    422.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1330.07  DOWNSTREAM(FEET) =   1326.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   168.00   CHANNEL SLOPE =  0.0189
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.761
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.26      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.36
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.16
  AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   2.41
  Tc(MIN.) =    7.41
  SUBAREA AREA(ACRES) =     0.26       SUBAREA RUNOFF(CFS) =    0.38
  EFFECTIVE AREA(ACRES) =      0.36     AREA-AVERAGED Fm(INCH/HR) =   0.13
  AREA-AVERAGED Fp(INCH/HR) =   1.33  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.4         PEAK FLOW RATE(CFS) =       0.53
```

```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   1.31
  LONGEST FLOWPATH FROM NODE    420.00 TO NODE    422.00 =     268.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    422.00 TO NODE    422.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.41
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.761
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.26      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.26      SUBAREA RUNOFF(CFS) =    0.38
  EFFECTIVE AREA(ACRES) =      0.62   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.6       PEAK FLOW RATE(CFS) =       0.91

****************************************************************************
  FLOW PROCESS FROM NODE    422.00 TO NODE    423.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1324.00  DOWNSTREAM(FEET) =  1310.69
  FLOW LENGTH(FEET) =    22.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   1.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.87
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.91
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    7.43
  LONGEST FLOWPATH FROM NODE    420.00 TO NODE    423.00 =     290.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    423.00 TO NODE    423.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.43
  RAINFALL INTENSITY(INCH/HR) =   1.76
  AREA-AVERAGED Fm(INCH/HR) =  0.13
```

```
 AREA-AVERAGED Fp(INCH/HR) =  1.33
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.62
 TOTAL STREAM AREA(ACRES) =       0.62
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.91

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        7.20   10.70    1.421  1.33( 0.13) 0.10       5.4     417.00
     1        7.18   11.66    1.367  1.33( 0.13) 0.10       5.8     414.00
     1        7.05   12.38    1.327  1.33( 0.13) 0.10       5.9     411.00
     2        0.91    7.43    1.758  1.33( 0.13) 0.10       0.6     420.00

 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        7.22    7.43    1.758  1.33( 0.13) 0.10       4.4     420.00
     2        7.92   10.70    1.421  1.33( 0.13) 0.10       6.0     417.00
     3        7.87   11.66    1.367  1.33( 0.13) 0.10       6.4     414.00
     4        7.72   12.38    1.327  1.33( 0.13) 0.10       6.5     411.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       7.92    Tc(MIN.) =    10.70
 EFFECTIVE AREA(ACRES) =       6.02   AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        6.5
 LONGEST FLOWPATH FROM NODE    411.00 TO NODE    423.00 =    1326.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    423.00 TO NODE    424.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1310.69  DOWNSTREAM(FEET) =  1309.34
 FLOW LENGTH(FEET) =    38.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.36
 ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       7.92
 PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   10.76
 LONGEST FLOWPATH FROM NODE    411.00 TO NODE    424.00 =    1364.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    424.00 TO NODE    424.00 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        7.22    7.49    1.751  1.33( 0.13) 0.10       4.4     420.00
      2        7.92   10.76    1.417  1.33( 0.13) 0.10       6.0     417.00
      3        7.87   11.72    1.364  1.33( 0.13) 0.10       6.4     414.00
      4        7.72   12.44    1.324  1.33( 0.13) 0.10       6.5     411.00
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    424.00 =    1364.00 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        4.77    6.26    1.894  1.33( 0.13) 0.10       2.9     407.00
      2        6.16   12.44    1.324  1.33( 0.13) 0.10       5.5     403.00
      3        6.31   13.77    1.249  1.33( 0.13) 0.10       6.0     400.00
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    424.00 =     991.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       11.33    6.26    1.894  1.33( 0.13) 0.10       6.5     407.00
      2       12.26    7.49    1.751  1.33( 0.13) 0.10       7.8     420.00
      3       13.70   10.76    1.417  1.33( 0.13) 0.10      10.8     417.00
      4       13.86   11.72    1.364  1.33( 0.13) 0.10      11.6     414.00
      5       13.88   12.44    1.324  1.33( 0.13) 0.10      12.0     411.00
      6       13.88   12.44    1.324  1.33( 0.13) 0.10      12.0     403.00
      7       13.60   13.77    1.249  1.33( 0.13) 0.10      12.5     400.00
    TOTAL AREA(ACRES) =        12.5

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       13.88  Tc(MIN.) =   12.437
  EFFECTIVE AREA(ACRES) =     12.04  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       12.5
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    424.00 =    1364.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    424.00 TO NODE    424.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    424.00 TO NODE    431.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1309.34  DOWNSTREAM(FEET) =  1302.92
  FLOW LENGTH(FEET) =   310.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.48
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.88
  PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =   12.98
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    431.00 =    1674.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    431.00 TO NODE    431.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
==========================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    431.00 TO NODE    431.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
==========================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    425.00 TO NODE    426.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.13

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.040
  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.)
  COMMERCIAL                 A        0.10      1.33     0.100    17    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.17
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.17

****************************************************************************
  FLOW PROCESS FROM NODE    426.00 TO NODE    427.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.13  DOWNSTREAM(FEET) =   1312.52
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =   402.00   CHANNEL SLOPE =  0.0413
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.651
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.73      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.67
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.00
  AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   3.36
  Tc(MIN.) =    8.36
  SUBAREA AREA(ACRES) =     0.73       SUBAREA RUNOFF(CFS) =    1.00
  EFFECTIVE AREA(ACRES) =      0.83     AREA-AVERAGED Fm(INCH/HR) =   0.13
  AREA-AVERAGED Fp(INCH/HR) =   1.33  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.8         PEAK FLOW RATE(CFS) =       1.13

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.07   FLOW VELOCITY(FEET/SEC.) =   2.24
  LONGEST FLOWPATH FROM NODE    425.00 TO NODE    427.00 =     502.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    427.00 TO NODE    427.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.36
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.651
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.73      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.73      SUBAREA RUNOFF(CFS) =    1.00
  EFFECTIVE AREA(ACRES) =      1.56   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.6       PEAK FLOW RATE(CFS) =       2.13

****************************************************************************
  FLOW PROCESS FROM NODE    427.00 TO NODE    430.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1309.00  DOWNSTREAM(FEET) =  1305.31
  FLOW LENGTH(FEET) =   191.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
```

```
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   5.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.95
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.13
  PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =    8.89
  LONGEST FLOWPATH FROM NODE    425.00 TO NODE    430.00 =     693.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    430.00 TO NODE    430.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.89
  RAINFALL INTENSITY(INCH/HR) =   1.59
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.56
  TOTAL STREAM AREA(ACRES) =       1.56
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.13

****************************************************************************
  FLOW PROCESS FROM NODE    428.00 TO NODE    429.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1322.64  DOWNSTREAM(FEET) =   1318.64

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.040
  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.)
  COMMERCIAL                 A        0.10      1.33     0.100    17    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.17
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.17

****************************************************************************
  FLOW PROCESS FROM NODE    429.00 TO NODE    430.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   1318.64  DOWNSTREAM(FEET) =   1314.94
  CHANNEL LENGTH THRU SUBAREA(FEET) =   138.00   CHANNEL SLOPE =  0.0268
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.838
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.09      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.24
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.32
  AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =   1.74
  Tc(MIN.) =    6.74
  SUBAREA AREA(ACRES) =     0.09       SUBAREA RUNOFF(CFS) =    0.14
  EFFECTIVE AREA(ACRES) =      0.19     AREA-AVERAGED Fm(INCH/HR) =   0.13
  AREA-AVERAGED Fp(INCH/HR) =   1.33  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.2         PEAK FLOW RATE(CFS) =       0.29

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.05   FLOW VELOCITY(FEET/SEC.) =   1.25
  LONGEST FLOWPATH FROM NODE    428.00 TO NODE    430.00 =     238.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    430.00 TO NODE    430.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.74
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.838
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.09      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.09      SUBAREA RUNOFF(CFS) =    0.14
  EFFECTIVE AREA(ACRES) =      0.28   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.3       PEAK FLOW RATE(CFS) =       0.43

****************************************************************************
  FLOW PROCESS FROM NODE    430.00 TO NODE    430.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
```

```
  TIME OF CONCENTRATION(MIN.) =    6.74
  RAINFALL INTENSITY(INCH/HR) =   1.84
  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.28
  TOTAL STREAM AREA(ACRES) =       0.28
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.43

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        2.13    8.89    1.589  1.33( 0.13) 0.10       1.6     425.00
      2        0.43    6.74    1.838  1.33( 0.13) 0.10       0.3     428.00

  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        2.32    6.74    1.838  1.33( 0.13) 0.10       1.5     428.00
      2        2.50    8.89    1.589  1.33( 0.13) 0.10       1.8     425.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       2.50    Tc(MIN.) =     8.89
  EFFECTIVE AREA(ACRES) =       1.84   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.8
  LONGEST FLOWPATH FROM NODE    425.00 TO NODE    430.00 =     693.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    430.00 TO NODE    431.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1305.31  DOWNSTREAM(FEET) =  1302.92
  FLOW LENGTH(FEET) =   124.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.19
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.50
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =    9.22
  LONGEST FLOWPATH FROM NODE    425.00 TO NODE    431.00 =     817.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    431.00 TO NODE    431.00 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        2.32    7.08    1.799  1.33( 0.13) 0.10       1.5     428.00
      2        2.50    9.22    1.550  1.33( 0.13) 0.10       1.8     425.00
  LONGEST FLOWPATH FROM NODE    425.00 TO NODE    431.00 =     817.00 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       11.33    6.82    1.829  1.33( 0.13) 0.10       6.5     407.00
      2       12.26    8.05    1.687  1.33( 0.13) 0.10       7.8     420.00
      3       13.70   11.31    1.387  1.33( 0.13) 0.10      10.8     417.00
      4       13.86   12.27    1.333  1.33( 0.13) 0.10      11.6     414.00
      5       13.88   12.98    1.293  1.33( 0.13) 0.10      12.0     411.00
      6       13.88   12.98    1.293  1.33( 0.13) 0.10      12.0     403.00
      7       13.60   14.31    1.219  1.33( 0.13) 0.10      12.5     400.00
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    431.00 =    1674.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc    Intensity   Fp(Fm)     Ap      Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
      1       13.61    6.82    1.829  1.33( 0.13) 0.10       7.9     407.00
      2       13.85    7.08    1.799  1.33( 0.13) 0.10       8.2     428.00
      3       14.66    8.05    1.687  1.33( 0.13) 0.10       9.4     420.00
      4       15.28    9.22    1.550  1.33( 0.13) 0.10      10.7     425.00
      5       15.91   11.31    1.387  1.33( 0.13) 0.10      12.6     417.00
      6       15.98   12.27    1.333  1.33( 0.13) 0.10      13.4     414.00
      7       15.93   12.98    1.293  1.33( 0.13) 0.10      13.9     411.00
      8       15.93   12.98    1.293  1.33( 0.13) 0.10      13.9     403.00
      9       15.53   14.31    1.219  1.33( 0.13) 0.10      14.4     400.00
    TOTAL AREA(ACRES) =        14.4

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       15.98  Tc(MIN.) =   12.267
  EFFECTIVE AREA(ACRES) =     13.43  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       14.4
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    431.00 =    1674.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    431.00 TO NODE    431.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    431.00 TO NODE    437.00 IS CODE =  31
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1302.92  DOWNSTREAM(FEET) =  1294.50
  FLOW LENGTH(FEET) =   379.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.34
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      15.98
  PIPE TRAVEL TIME(MIN.) =   0.61    Tc(MIN.) =   12.88
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    437.00 =    2053.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    437.00 TO NODE    437.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    437.00 TO NODE    437.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    432.00 TO NODE    433.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1334.00  DOWNSTREAM(FEET) =   1333.15

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.040
  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.)
  COMMERCIAL                 A        0.10      1.33     0.100    17    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.17
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.17

****************************************************************************
  FLOW PROCESS FROM NODE    433.00 TO NODE    434.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
```

```
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1333.15  DOWNSTREAM(FEET) =   1299.66
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2503.00   CHANNEL SLOPE =  0.0134
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.846
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        2.63      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.12
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.44
  AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =  28.93
  Tc(MIN.) =   33.93
  SUBAREA AREA(ACRES) =     2.63       SUBAREA RUNOFF(CFS) =    1.80
  EFFECTIVE AREA(ACRES) =      2.73     AREA-AVERAGED Fm(INCH/HR) =   0.13
  AREA-AVERAGED Fp(INCH/HR) =   1.33  AREA-AVERAGED Ap =   0.10
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TOTAL AREA(ACRES) =        2.7         PEAK FLOW RATE(CFS) =       1.87

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.11   FLOW VELOCITY(FEET/SEC.) =   1.57
  LONGEST FLOWPATH FROM NODE    432.00 TO NODE    434.00 =    2603.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    434.00 TO NODE    434.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   33.93
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.846
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        2.63      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  SUBAREA AREA(ACRES) =    2.63      SUBAREA RUNOFF(CFS) =    1.80
  EFFECTIVE AREA(ACRES) =      5.36   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
```

```
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =       3.67

****************************************************************************
  FLOW PROCESS FROM NODE    434.00 TO NODE    437.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1295.87  DOWNSTREAM(FEET) =  1294.50
  FLOW LENGTH(FEET) =   275.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  10.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.04
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.67
  PIPE TRAVEL TIME(MIN.) =   1.13    Tc(MIN.) =   35.07
  LONGEST FLOWPATH FROM NODE    432.00 TO NODE    437.00 =    2878.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    437.00 TO NODE    437.00 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        3.67   35.07    0.837  1.33( 0.13) 0.10       5.4     432.00
  LONGEST FLOWPATH FROM NODE    432.00 TO NODE    437.00 =    2878.00 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       13.61    7.47    1.754  1.33( 0.13) 0.10       7.9     407.00
      2       13.85    7.73    1.724  1.33( 0.13) 0.10       8.2     428.00
      3       14.66    8.69    1.612  1.33( 0.13) 0.10       9.4     420.00
      4       15.28    9.84    1.478  1.33( 0.13) 0.10      10.7     425.00
      5       15.91   11.92    1.353  1.33( 0.13) 0.10      12.6     417.00
      6       15.98   12.88    1.299  1.33( 0.13) 0.10      13.4     414.00
      7       15.93   13.59    1.259  1.33( 0.13) 0.10      13.9     411.00
      8       15.93   13.59    1.259  1.33( 0.13) 0.10      13.9     403.00
      9       15.53   14.93    1.184  1.33( 0.13) 0.10      14.4     400.00
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    437.00 =    2053.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       15.29    7.47    1.754  1.33( 0.13) 0.10       9.1     407.00
      2       15.56    7.73    1.724  1.33( 0.13) 0.10       9.4     428.00
      3       16.45    8.69    1.612  1.33( 0.13) 0.10      10.7     420.00
      4       17.12    9.84    1.478  1.33( 0.13) 0.10      12.2     425.00
```

```
      5       17.93   11.92    1.353  1.33( 0.13) 0.10      14.5     417.00
      6       18.07   12.88    1.299  1.33( 0.13) 0.10      15.4     414.00
      7       18.07   13.59    1.259  1.33( 0.13) 0.10      16.0     411.00
      8       18.07   13.59    1.259  1.33( 0.13) 0.10      16.0     403.00
      9       17.74   14.93    1.184  1.33( 0.13) 0.10      16.6     400.00
     10       14.65   35.07    0.837  1.33( 0.13) 0.10      19.7     432.00
    TOTAL AREA(ACRES) =        19.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       18.07  Tc(MIN.) =   12.879
  EFFECTIVE AREA(ACRES) =     15.40  AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       19.7
  LONGEST FLOWPATH FROM NODE    432.00 TO NODE    437.00 =    2878.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    437.00 TO NODE    437.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    437.00 TO NODE    437.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    437.00 TO NODE    437.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    435.00 TO NODE    436.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1328.83  DOWNSTREAM(FEET) =   1322.08

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.040
  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.)
  COMMERCIAL                 A        0.10      1.33     0.100    17    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.17
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.17

****************************************************************************
  FLOW PROCESS FROM NODE    436.00 TO NODE    437.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1322.08  DOWNSTREAM(FEET) =   1294.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   568.00   CHANNEL SLOPE =  0.0486
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.614
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        2.59      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.92
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.58
  AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   3.67
  Tc(MIN.) =    8.67
  SUBAREA AREA(ACRES) =     2.59       SUBAREA RUNOFF(CFS) =    3.45
  EFFECTIVE AREA(ACRES) =      2.69     AREA-AVERAGED Fm(INCH/HR) =   0.13
  AREA-AVERAGED Fp(INCH/HR) =   1.33  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        2.7         PEAK FLOW RATE(CFS) =       3.59

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.11   FLOW VELOCITY(FEET/SEC.) =   3.01
  LONGEST FLOWPATH FROM NODE    435.00 TO NODE    437.00 =     668.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    437.00 TO NODE    437.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.67
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.614
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        2.59      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    2.59      SUBAREA RUNOFF(CFS) =    3.45
  EFFECTIVE AREA(ACRES) =      5.28   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
```

```
 TOTAL AREA(ACRES) =        5.3       PEAK FLOW RATE(CFS) =       7.04

****************************************************************************
 FLOW PROCESS FROM NODE    437.00 TO NODE    437.00 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        7.04    8.67    1.614  1.33( 0.13) 0.10       5.3     435.00
 LONGEST FLOWPATH FROM NODE    435.00 TO NODE    437.00 =     668.00 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       15.29    7.47    1.754  1.33( 0.13) 0.10       9.1     407.00
     2       15.56    7.73    1.724  1.33( 0.13) 0.10       9.4     428.00
     3       16.45    8.69    1.612  1.33( 0.13) 0.10      10.7     420.00
     4       17.12    9.84    1.478  1.33( 0.13) 0.10      12.2     425.00
     5       17.93   11.92    1.353  1.33( 0.13) 0.10      14.5     417.00
     6       18.07   12.88    1.299  1.33( 0.13) 0.10      15.4     414.00
     7       18.07   13.59    1.259  1.33( 0.13) 0.10      16.0     411.00
     8       18.07   13.59    1.259  1.33( 0.13) 0.10      16.0     403.00
     9       17.74   14.93    1.184  1.33( 0.13) 0.10      16.6     400.00
    10       14.65   35.07    0.837  1.33( 0.13) 0.10      19.7     432.00
 LONGEST FLOWPATH FROM NODE    432.00 TO NODE    437.00 =    2878.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       21.92    7.47    1.754  1.33( 0.13) 0.10      13.6     407.00
     2       22.29    7.73    1.724  1.33( 0.13) 0.10      14.1     428.00
     3       23.47    8.67    1.614  1.33( 0.13) 0.10      16.0     435.00
     4       23.48    8.69    1.612  1.33( 0.13) 0.10      16.0     420.00
     5       23.51    9.84    1.478  1.33( 0.13) 0.10      17.5     425.00
     6       23.73   11.92    1.353  1.33( 0.13) 0.10      19.7     417.00
     7       23.62   12.88    1.299  1.33( 0.13) 0.10      20.7     414.00
     8       23.45   13.59    1.259  1.33( 0.13) 0.10      21.2     411.00
     9       23.45   13.59    1.259  1.33( 0.13) 0.10      21.2     403.00
    10       22.81   14.93    1.184  1.33( 0.13) 0.10      21.9     400.00
    11       18.23   35.07    0.837  1.33( 0.13) 0.10      25.0     432.00
   TOTAL AREA(ACRES) =       25.0

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      23.73  Tc(MIN.) =   11.919
 EFFECTIVE AREA(ACRES) =    19.74  AREA-AVERAGED Fm(INCH/HR) =  0.13
 AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =      25.0
```

```
 LONGEST FLOWPATH FROM NODE    432.00 TO NODE    437.00 =    2878.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    437.00 TO NODE    437.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    500.00 TO NODE    501.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 ELEVATION DATA: UPSTREAM(FEET) =   1335.00  DOWNSTREAM(FEET) =   1333.18

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.040
 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.)
 COMMERCIAL                 A        0.10      1.33     0.100    17    5.00
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      0.17
 TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.17

****************************************************************************
 FLOW PROCESS FROM NODE    501.00 TO NODE    502.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1333.18  DOWNSTREAM(FEET) =   1298.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  2797.00   CHANNEL SLOPE =  0.0126
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.753
 SUBAREA LOSS RATE DATA(AMC  I ):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        0.67      1.33     0.100    17
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
 * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.38
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.14
```

```
  AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =  41.03
  Tc(MIN.) =   46.03
  SUBAREA AREA(ACRES) =     0.67       SUBAREA RUNOFF(CFS) =    0.41
  EFFECTIVE AREA(ACRES) =      0.77     AREA-AVERAGED Fm(INCH/HR) =   0.13
  AREA-AVERAGED Fp(INCH/HR) =   1.33  AREA-AVERAGED Ap =   0.10
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TOTAL AREA(ACRES) =        0.8         PEAK FLOW RATE(CFS) =       0.47

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   1.16
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    502.00 =    2897.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    502.00 TO NODE    502.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   46.03
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  0.753
  SUBAREA LOSS RATE DATA(AMC  I ):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.67      1.33     0.100    17
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  1.33
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  SUBAREA AREA(ACRES) =    0.67      SUBAREA RUNOFF(CFS) =    0.41
  EFFECTIVE AREA(ACRES) =      1.44   AREA-AVERAGED Fm(INCH/HR) =  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap =  0.10
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TOTAL AREA(ACRES) =        1.4       PEAK FLOW RATE(CFS) =       0.88
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.4  TC(MIN.) =     46.03
  EFFECTIVE AREA(ACRES) =      1.44  AREA-AVERAGED Fm(INCH/HR)=  0.13
  AREA-AVERAGED Fp(INCH/HR) =  1.33  AREA-AVERAGED Ap = 0.100
  PEAK FLOW RATE(CFS)   =       0.88
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```



```
************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        (c) Copyright 1983-2011 Advanced Engineering Software (aes)
            Ver. 18.0  Release Date: 07/01/2011  License ID 1499

                          Analysis prepared by:
```

```
 ************************* DESCRIPTION OF STUDY *************************
* 2400 HIGHLAND                                                        *
* 10 YEAR RECURRENCE INTERVAL                                          *
* PROPOSED CONDITIONS                                                  *
 ************************************************************************

  FILE NAME: CARS10P.DAT
  TIME/DATE OF STUDY: 13:44 11/16/2023
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   10.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED TABLED RAINFALL USED*
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)    5.00;  3.250
   2)   10.00;  2.330
   3)   15.00;  1.880
   4)   30.00;  1.390
   5)   60.00;  1.020
   6)  120.00;  0.720
   7)  180.00;  0.588
   8)  360.00;  0.418
   9)  720.00;  0.280
  *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 0.0312 0.167 0.0150
```

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

****************************************************************************
  FLOW PROCESS FROM NODE    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) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1371.76  DOWNSTREAM(FEET) =   1364.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.250
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1364.00  DOWNSTREAM(FEET) =   1296.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  4918.00   CHANNEL SLOPE =  0.0138
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   0.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.912
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        6.14      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.82
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.07
```

```
  AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =  76.52
  Tc(MIN.) =   81.52
  SUBAREA AREA(ACRES) =     6.14       SUBAREA RUNOFF(CFS) =    4.54
  EFFECTIVE AREA(ACRES) =      6.24     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TOTAL AREA(ACRES) =        6.2         PEAK FLOW RATE(CFS) =       4.61

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.19   FLOW VELOCITY(FEET/SEC.) =   1.24
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =    5018.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   81.52
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  0.912
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        6.14      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  SUBAREA AREA(ACRES) =    6.14      SUBAREA RUNOFF(CFS) =    4.54
  EFFECTIVE AREA(ACRES) =     12.38   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  * RAINFALL INTENSITY IS LESS THAN AREA-AVERAGED Fp;
  * IMPERVIOUS AREA USED FOR RUNOFF ESTIMATES.
  TOTAL AREA(ACRES) =       12.4       PEAK FLOW RATE(CFS) =       9.15

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1338.05  DOWNSTREAM(FEET) =   1336.33

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.250
  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.)
```

```
  COMMERCIAL                  A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1336.33  DOWNSTREAM(FEET) =   1312.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   817.00   CHANNEL SLOPE =  0.0298
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.553
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  A       12.52      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      14.42
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.60
  AVERAGE FLOW DEPTH(FEET) =   0.20   TRAVEL TIME(MIN.) =   3.79
  Tc(MIN.) =    8.79
  SUBAREA AREA(ACRES) =    12.52       SUBAREA RUNOFF(CFS) =   27.67
  EFFECTIVE AREA(ACRES) =     12.62     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.97  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =       12.6         PEAK FLOW RATE(CFS) =      27.89

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.25   FLOW VELOCITY(FEET/SEC.) =   4.35
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.79
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.553
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  A       12.52      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   12.52      SUBAREA RUNOFF(CFS) =   27.67
```

```
  EFFECTIVE AREA(ACRES) =     25.14   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       25.1       PEAK FLOW RATE(CFS) =      55.56

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.250
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1328.53
  CHANNEL LENGTH THRU SUBAREA(FEET) =   201.00   CHANNEL SLOPE =  0.0028
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.527
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.98      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.36
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.85
  AVERAGE FLOW DEPTH(FEET) =   0.13   TRAVEL TIME(MIN.) =   3.93
  Tc(MIN.) =    8.93
  SUBAREA AREA(ACRES) =     0.98       SUBAREA RUNOFF(CFS) =    2.14
  EFFECTIVE AREA(ACRES) =      1.08     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =       2.36
```

```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   0.96
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     301.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    302.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.93
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.527
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.98      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.98      SUBAREA RUNOFF(CFS) =    2.14
  EFFECTIVE AREA(ACRES) =      2.06   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.1       PEAK FLOW RATE(CFS) =       4.50

****************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    305.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1321.02  DOWNSTREAM(FEET) =  1319.98
  FLOW LENGTH(FEET) =   208.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.32
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.50
  PIPE TRAVEL TIME(MIN.) =   0.80    Tc(MIN.) =    9.73
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    305.00 =     509.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    305.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.73
  RAINFALL INTENSITY(INCH/HR) =   2.38
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
```

```
  EFFECTIVE STREAM AREA(ACRES) =       2.06
  TOTAL STREAM AREA(ACRES) =       2.06
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.50

****************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    304.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.250
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    305.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1328.71
  CHANNEL LENGTH THRU SUBAREA(FEET) =   193.00   CHANNEL SLOPE =  0.0020
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.372
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.72      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.04
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.67
  AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   4.77
  Tc(MIN.) =    9.77
  SUBAREA AREA(ACRES) =     0.72       SUBAREA RUNOFF(CFS) =    1.47
  EFFECTIVE AREA(ACRES) =      0.82     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.8         PEAK FLOW RATE(CFS) =       1.68
```

```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.15   FLOW VELOCITY(FEET/SEC.) =   0.78
  LONGEST FLOWPATH FROM NODE    303.00 TO NODE    305.00 =     293.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    305.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.77
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.372
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  A        0.72      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.72      SUBAREA RUNOFF(CFS) =    1.47
  EFFECTIVE AREA(ACRES) =      1.54   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.5       PEAK FLOW RATE(CFS) =       3.15

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    305.00 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.) =    9.77
  RAINFALL INTENSITY(INCH/HR) =   2.37
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.54
  TOTAL STREAM AREA(ACRES) =       1.54
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.15

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        4.50    9.73    2.379  0.98( 0.10) 0.10       2.1     300.00
      2        3.15    9.77    2.372  0.98( 0.10) 0.10       1.5     303.00

  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        7.65    9.73    2.379  0.98( 0.10) 0.10       3.6     300.00
    2        7.64    9.77    2.372  0.98( 0.10) 0.10       3.6     303.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       7.65    Tc(MIN.) =     9.73
  EFFECTIVE AREA(ACRES) =       3.59   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        3.6
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    305.00 =     509.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    308.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1319.98  DOWNSTREAM(FEET) =  1318.94
  FLOW LENGTH(FEET) =   208.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.92
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.65
  PIPE TRAVEL TIME(MIN.) =   0.71    Tc(MIN.) =   10.44
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    308.00 =     717.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    308.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.44
  RAINFALL INTENSITY(INCH/HR) =   2.29
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       3.59
  TOTAL STREAM AREA(ACRES) =       3.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.65

****************************************************************************
  FLOW PROCESS FROM NODE    306.00 TO NODE    307.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.250
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    308.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1328.18
  CHANNEL LENGTH THRU SUBAREA(FEET) =   201.00   CHANNEL SLOPE =  0.0045
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.686
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.24      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.74
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.09
  AVERAGE FLOW DEPTH(FEET) =   0.13   TRAVEL TIME(MIN.) =   3.06
  Tc(MIN.) =    8.06
  SUBAREA AREA(ACRES) =     1.24       SUBAREA RUNOFF(CFS) =    2.89
  EFFECTIVE AREA(ACRES) =      1.34     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.97  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.3         PEAK FLOW RATE(CFS) =       3.12

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   1.27
  LONGEST FLOWPATH FROM NODE    306.00 TO NODE    308.00 =     301.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    308.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.06
```

```
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.686
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.24      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.24      SUBAREA RUNOFF(CFS) =    2.89
  EFFECTIVE AREA(ACRES) =      2.58   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.6       PEAK FLOW RATE(CFS) =       6.01

****************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    308.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.06
  RAINFALL INTENSITY(INCH/HR) =   2.69
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       2.58
  TOTAL STREAM AREA(ACRES) =       2.58
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.01

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        7.65   10.44    2.291  0.98( 0.10) 0.10       3.6     300.00
      1        7.64   10.47    2.287  0.98( 0.10) 0.10       3.6     303.00
      2        6.01    8.06    2.686  0.98( 0.10) 0.10       2.6     306.00

  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       12.99    8.06    2.686  0.98( 0.10) 0.10       5.4     306.00
      2       12.75   10.44    2.291  0.98( 0.10) 0.10       6.2     300.00
      3       12.73   10.47    2.287  0.98( 0.10) 0.10       6.2     303.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      12.99    Tc(MIN.) =     8.06
  EFFECTIVE AREA(ACRES) =       5.36   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
```

```
  TOTAL AREA(ACRES) =        6.2
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    308.00 =     717.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    311.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1318.94  DOWNSTREAM(FEET) =  1317.82
  FLOW LENGTH(FEET) =   224.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.55
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.99
  PIPE TRAVEL TIME(MIN.) =   0.67    Tc(MIN.) =    8.74
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    311.00 =     941.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    311.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.74
  RAINFALL INTENSITY(INCH/HR) =   2.56
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       5.36
  TOTAL STREAM AREA(ACRES) =       6.18
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      12.99

****************************************************************************
  FLOW PROCESS FROM NODE    309.00 TO NODE    310.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1352.60  DOWNSTREAM(FEET) =   1348.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.250
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    311.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1348.30  DOWNSTREAM(FEET) =   1328.52
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1374.00   CHANNEL SLOPE =  0.0144
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.745
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.81      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.67
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.62
  AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =  14.12
  Tc(MIN.) =   19.12
  SUBAREA AREA(ACRES) =     1.81       SUBAREA RUNOFF(CFS) =    2.68
  EFFECTIVE AREA(ACRES) =      1.91     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.97  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.9         PEAK FLOW RATE(CFS) =       2.83

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.12   FLOW VELOCITY(FEET/SEC.) =   1.83
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    311.00 =    1474.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    311.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   19.12
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.745
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.81      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.81      SUBAREA RUNOFF(CFS) =    2.68
  EFFECTIVE AREA(ACRES) =      3.72   AREA-AVERAGED Fm(INCH/HR) =  0.10
```

```
 AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        3.7       PEAK FLOW RATE(CFS) =       5.52

****************************************************************************
 FLOW PROCESS FROM NODE    311.00 TO NODE    311.00 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.) =   19.12
 RAINFALL INTENSITY(INCH/HR) =   1.75
 AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.97
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       3.72
 TOTAL STREAM AREA(ACRES) =       3.72
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.52

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       12.99    8.74    2.563  0.98( 0.10) 0.10       5.4     306.00
     1       12.75   11.11    2.230  0.98( 0.10) 0.10       6.2     300.00
     1       12.73   11.15    2.227  0.98( 0.10) 0.10       6.2     303.00
     2        5.52   19.12    1.745  0.97( 0.10) 0.10       3.7     309.00

 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       16.76    8.74    2.563  0.98( 0.10) 0.10       7.1     306.00
     2       16.90   11.11    2.230  0.97( 0.10) 0.10       8.3     300.00
     3       16.88   11.15    2.227  0.98( 0.10) 0.10       8.3     303.00
     4       15.37   19.12    1.745  0.98( 0.10) 0.10       9.9     309.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      16.90    Tc(MIN.) =    11.11
 EFFECTIVE AREA(ACRES) =       8.34   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        9.9
 LONGEST FLOWPATH FROM NODE    309.00 TO NODE    311.00 =    1474.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    311.00 TO NODE    314.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1317.82  DOWNSTREAM(FEET) =  1316.86
  FLOW LENGTH(FEET) =   191.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.96
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.90
  PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =   11.65
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    314.00 =    1665.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    314.00 TO NODE    314.00 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.) =   11.65
  RAINFALL INTENSITY(INCH/HR) =   2.18
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       8.34
  TOTAL STREAM AREA(ACRES) =       9.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      16.90

****************************************************************************
  FLOW PROCESS FROM NODE    213.00 TO NODE    313.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.250
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE    313.00 TO NODE    314.00 IS CODE =  51
```

```
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1328.42
  CHANNEL LENGTH THRU SUBAREA(FEET) =   201.00   CHANNEL SLOPE =  0.0033
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.568
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.99      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.40
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.90
  AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   3.71
  Tc(MIN.) =    8.71
  SUBAREA AREA(ACRES) =     0.99       SUBAREA RUNOFF(CFS) =    2.20
  EFFECTIVE AREA(ACRES) =      1.09     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =       2.42

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   1.01
  LONGEST FLOWPATH FROM NODE    213.00 TO NODE    314.00 =     301.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    314.00 TO NODE    314.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =    8.71
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.568
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.99      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.99      SUBAREA RUNOFF(CFS) =    2.20
  EFFECTIVE AREA(ACRES) =      2.08   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.1       PEAK FLOW RATE(CFS) =       4.63

****************************************************************************
  FLOW PROCESS FROM NODE    314.00 TO NODE    314.00 IS CODE =   1
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.71
  RAINFALL INTENSITY(INCH/HR) =   2.57
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       2.08
  TOTAL STREAM AREA(ACRES) =       2.08
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.63

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       16.76    9.27    2.464  0.98( 0.10) 0.10       7.1     306.00
      1       16.90   11.65    2.182  0.97( 0.10) 0.10       8.3     300.00
      1       16.88   11.68    2.179  0.98( 0.10) 0.10       8.3     303.00
      1       15.37   19.68    1.727  0.98( 0.10) 0.10       9.9     309.00
      2        4.63    8.71    2.568  0.98( 0.10) 0.10       2.1     213.00

  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       21.06    8.71    2.568  0.98( 0.10) 0.10       8.7     213.00
      2       21.19    9.27    2.464  0.98( 0.10) 0.10       9.1     306.00
      3       20.80   11.65    2.182  0.97( 0.10) 0.10      10.4     300.00
      4       20.78   11.68    2.179  0.98( 0.10) 0.10      10.4     303.00
      5       18.42   19.68    1.727  0.98( 0.10) 0.10      12.0     309.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      21.19    Tc(MIN.) =     9.27
  EFFECTIVE AREA(ACRES) =       9.14   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       12.0
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    314.00 =    1665.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    314.00 TO NODE    317.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1316.86  DOWNSTREAM(FEET) =  1315.82
  FLOW LENGTH(FEET) =   208.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  22.0 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.12
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.19
  PIPE TRAVEL TIME(MIN.) =   0.57    Tc(MIN.) =    9.84
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    317.00 =    1873.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    317.00 TO NODE    317.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.84
  RAINFALL INTENSITY(INCH/HR) =   2.36
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       9.14
  TOTAL STREAM AREA(ACRES) =      11.98
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      21.19

****************************************************************************
  FLOW PROCESS FROM NODE    315.00 TO NODE    316.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.250
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE    316.00 TO NODE    317.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1328.42
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =   201.00   CHANNEL SLOPE =  0.0033
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.568
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.99      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.40
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.90
  AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   3.71
  Tc(MIN.) =    8.71
  SUBAREA AREA(ACRES) =     0.99       SUBAREA RUNOFF(CFS) =    2.20
  EFFECTIVE AREA(ACRES) =      1.09     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =       2.42

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   1.01
  LONGEST FLOWPATH FROM NODE    315.00 TO NODE    317.00 =     301.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    317.00 TO NODE    317.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.71
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.568
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.99      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.99      SUBAREA RUNOFF(CFS) =    2.20
  EFFECTIVE AREA(ACRES) =      2.08   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.1       PEAK FLOW RATE(CFS) =       4.63

****************************************************************************
  FLOW PROCESS FROM NODE    317.00 TO NODE    317.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.71
```

```
 RAINFALL INTENSITY(INCH/HR) =   2.57
 AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.98
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       2.08
 TOTAL STREAM AREA(ACRES) =       2.08
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.63

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       21.06    9.27    2.464  0.98( 0.10) 0.10       8.7     213.00
     1       21.19    9.84    2.360  0.98( 0.10) 0.10       9.1     306.00
     1       20.80   12.21    2.131  0.97( 0.10) 0.10      10.4     300.00
     1       20.78   12.25    2.128  0.98( 0.10) 0.10      10.4     303.00
     1       18.42   20.26    1.708  0.98( 0.10) 0.10      12.0     309.00
     2        4.63    8.71    2.568  0.98( 0.10) 0.10       2.1     315.00

 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       25.27    8.71    2.568  0.98( 0.10) 0.10      10.3     315.00
     2       25.49    9.27    2.464  0.98( 0.10) 0.10      10.8     213.00
     3       25.43    9.84    2.360  0.98( 0.10) 0.10      11.2     306.00
     4       24.60   12.21    2.131  0.97( 0.10) 0.10      12.5     300.00
     5       24.58   12.25    2.128  0.98( 0.10) 0.10      12.5     303.00
     6       21.43   20.26    1.708  0.98( 0.10) 0.10      14.1     309.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      25.49    Tc(MIN.) =     9.27
 EFFECTIVE AREA(ACRES) =      10.79   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =       14.1
 LONGEST FLOWPATH FROM NODE    309.00 TO NODE    317.00 =    1873.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    317.00 TO NODE    320.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1315.82  DOWNSTREAM(FEET) =  1314.78
 FLOW LENGTH(FEET) =   207.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.53
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      25.49
```

```
  PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =    9.80
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    320.00 =    2080.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    320.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.80
  RAINFALL INTENSITY(INCH/HR) =   2.37
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =      10.79
  TOTAL STREAM AREA(ACRES) =      14.06
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      25.49

****************************************************************************
  FLOW PROCESS FROM NODE    318.00 TO NODE    319.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.250
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE    319.00 TO NODE    320.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1328.42
  CHANNEL LENGTH THRU SUBAREA(FEET) =   201.00   CHANNEL SLOPE =  0.0033
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
```

```
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.587
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.07      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.48
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.93
  AVERAGE FLOW DEPTH(FEET) =   0.13   TRAVEL TIME(MIN.) =   3.60
  Tc(MIN.) =    8.60
  SUBAREA AREA(ACRES) =     1.07       SUBAREA RUNOFF(CFS) =    2.40
  EFFECTIVE AREA(ACRES) =      1.17     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.2         PEAK FLOW RATE(CFS) =       2.62

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   1.07
  LONGEST FLOWPATH FROM NODE    318.00 TO NODE    320.00 =     301.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    320.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.60
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.587
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.07      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.07      SUBAREA RUNOFF(CFS) =    2.40
  EFFECTIVE AREA(ACRES) =      2.24   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.2       PEAK FLOW RATE(CFS) =       5.02

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    320.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.60
  RAINFALL INTENSITY(INCH/HR) =   2.59
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
```

```
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       2.24
 TOTAL STREAM AREA(ACRES) =       2.24
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.02

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       25.27    9.23    2.471  0.98( 0.10) 0.10      10.3     315.00
     1       25.49    9.80    2.367  0.98( 0.10) 0.10      10.8     213.00
     1       25.43   10.37    2.297  0.98( 0.10) 0.10      11.2     306.00
     1       24.60   12.74    2.083  0.97( 0.10) 0.10      12.5     300.00
     1       24.58   12.78    2.080  0.98( 0.10) 0.10      12.5     303.00
     1       21.43   20.80    1.690  0.98( 0.10) 0.10      14.1     309.00
     2        5.02    8.60    2.587  0.98( 0.10) 0.10       2.2     318.00

 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       29.71    8.60    2.587  0.98( 0.10) 0.10      11.8     318.00
     2       30.05    9.23    2.471  0.98( 0.10) 0.10      12.5     315.00
     3       30.06    9.80    2.367  0.98( 0.10) 0.10      13.0     213.00
     4       29.86   10.37    2.297  0.98( 0.10) 0.10      13.5     306.00
     5       28.61   12.74    2.083  0.97( 0.10) 0.10      14.7     300.00
     6       28.58   12.78    2.080  0.98( 0.10) 0.10      14.7     303.00
     7       24.65   20.80    1.690  0.98( 0.10) 0.10      16.3     309.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      30.06    Tc(MIN.) =     9.80
 EFFECTIVE AREA(ACRES) =      13.03   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =       16.3
 LONGEST FLOWPATH FROM NODE    309.00 TO NODE    320.00 =    2080.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    320.00 TO NODE    323.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1314.78  DOWNSTREAM(FEET) =  1313.87
 FLOW LENGTH(FEET) =   182.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.85
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      30.06
 PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =   10.24
```

```
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    323.00 =    2262.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    323.00 TO NODE    323.00 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.) =   10.24
  RAINFALL INTENSITY(INCH/HR) =   2.31
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =      13.03
  TOTAL STREAM AREA(ACRES) =      16.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      30.06

****************************************************************************
  FLOW PROCESS FROM NODE    321.00 TO NODE    322.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1349.12  DOWNSTREAM(FEET) =   1342.96

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.250
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE    322.00 TO NODE    323.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1342.96  DOWNSTREAM(FEET) =   1328.02
  CHANNEL LENGTH THRU SUBAREA(FEET) =   452.00   CHANNEL SLOPE =  0.0331
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.608
```

```
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.14      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.61
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.16
  AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   3.49
  Tc(MIN.) =    8.49
  SUBAREA AREA(ACRES) =     1.14       SUBAREA RUNOFF(CFS) =    2.58
  EFFECTIVE AREA(ACRES) =      1.24     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.2         PEAK FLOW RATE(CFS) =       2.80

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.10   FLOW VELOCITY(FEET/SEC.) =   2.62
  LONGEST FLOWPATH FROM NODE    321.00 TO NODE    323.00 =     552.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    323.00 TO NODE    323.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.49
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.608
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.14      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.14      SUBAREA RUNOFF(CFS) =    2.58
  EFFECTIVE AREA(ACRES) =      2.38   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.4       PEAK FLOW RATE(CFS) =       5.38

****************************************************************************
  FLOW PROCESS FROM NODE    323.00 TO NODE    323.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.49
  RAINFALL INTENSITY(INCH/HR) =   2.61
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97
  AREA-AVERAGED Ap =  0.10
```

```
  EFFECTIVE STREAM AREA(ACRES) =       2.38
  TOTAL STREAM AREA(ACRES) =       2.38
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.38

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       29.71    9.05    2.506  0.98( 0.10) 0.10      11.8     318.00
      1       30.05    9.68    2.389  0.98( 0.10) 0.10      12.5     315.00
      1       30.06   10.24    2.308  0.98( 0.10) 0.10      13.0     213.00
      1       29.86   10.81    2.257  0.98( 0.10) 0.10      13.5     306.00
      1       28.61   13.19    2.043  0.97( 0.10) 0.10      14.7     300.00
      1       28.58   13.23    2.040  0.98( 0.10) 0.10      14.7     303.00
      1       24.65   21.27    1.675  0.98( 0.10) 0.10      16.3     309.00
      2        5.38    8.49    2.608  0.97( 0.10) 0.10       2.4     321.00

  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       34.45    8.49    2.608  0.98( 0.10) 0.10      13.4     321.00
      2       34.87    9.05    2.506  0.98( 0.10) 0.10      14.2     318.00
      3       34.96    9.68    2.389  0.98( 0.10) 0.10      14.9     315.00
      4       34.80   10.24    2.308  0.98( 0.10) 0.10      15.4     213.00
      5       34.49   10.81    2.257  0.98( 0.10) 0.10      15.8     306.00
      6       32.77   13.19    2.043  0.97( 0.10) 0.10      17.1     300.00
      7       32.74   13.23    2.040  0.97( 0.10) 0.10      17.1     303.00
      8       28.02   21.27    1.675  0.98( 0.10) 0.10      18.7     309.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      34.96    Tc(MIN.) =     9.68
  EFFECTIVE AREA(ACRES) =      14.87   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       18.7
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    323.00 =    2262.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    323.00 TO NODE    326.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1313.87  DOWNSTREAM(FEET) =  1312.97
  FLOW LENGTH(FEET) =   180.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  25.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.99
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      34.96
```

```
  PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =   10.11
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    326.00 =    2442.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    326.00 TO NODE    326.00 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.) =   10.11
  RAINFALL INTENSITY(INCH/HR) =   2.32
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =      14.87
  TOTAL STREAM AREA(ACRES) =      18.68
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      34.96

****************************************************************************
  FLOW PROCESS FROM NODE    324.00 TO NODE    325.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1331.16  DOWNSTREAM(FEET) =   1328.79

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.250
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE    325.00 TO NODE    326.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1328.79  DOWNSTREAM(FEET) =   1327.69
  CHANNEL LENGTH THRU SUBAREA(FEET) =    79.00   CHANNEL SLOPE =  0.0139
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
```

```
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.072
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.45      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.89
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.36
  AVERAGE FLOW DEPTH(FEET) =   0.08   TRAVEL TIME(MIN.) =   0.97
  Tc(MIN.) =    5.97
  SUBAREA AREA(ACRES) =     0.45       SUBAREA RUNOFF(CFS) =    1.20
  EFFECTIVE AREA(ACRES) =      0.55     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.6         PEAK FLOW RATE(CFS) =       1.47

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.10   FLOW VELOCITY(FEET/SEC.) =   1.60
  LONGEST FLOWPATH FROM NODE    324.00 TO NODE    326.00 =     179.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    326.00 TO NODE    326.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.97
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.072
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.45      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.45      SUBAREA RUNOFF(CFS) =    1.20
  EFFECTIVE AREA(ACRES) =      1.00   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.0       PEAK FLOW RATE(CFS) =       2.68

****************************************************************************
  FLOW PROCESS FROM NODE    326.00 TO NODE    326.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.97
  RAINFALL INTENSITY(INCH/HR) =   3.07
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
```

```
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.00
  TOTAL STREAM AREA(ACRES) =       1.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.68

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       34.45    8.92    2.529  0.98( 0.10) 0.10      13.4     321.00
      1       34.87    9.48    2.427  0.98( 0.10) 0.10      14.2     318.00
      1       34.96   10.11    2.320  0.98( 0.10) 0.10      14.9     315.00
      1       34.80   10.67    2.270  0.98( 0.10) 0.10      15.4     213.00
      1       34.49   11.24    2.219  0.98( 0.10) 0.10      15.8     306.00
      1       32.77   13.62    2.004  0.97( 0.10) 0.10      17.1     300.00
      1       32.74   13.66    2.001  0.97( 0.10) 0.10      17.1     303.00
      1       28.02   21.73    1.660  0.98( 0.10) 0.10      18.7     309.00
      2        2.68    5.97    3.072  0.98( 0.10) 0.10       1.0     324.00

  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       30.86    5.97    3.072  0.98( 0.10) 0.10      10.0     324.00
      2       36.63    8.92    2.529  0.98( 0.10) 0.10      14.4     321.00
      3       36.96    9.48    2.427  0.98( 0.10) 0.10      15.2     318.00
      4       36.96   10.11    2.320  0.98( 0.10) 0.10      15.9     315.00
      5       36.75   10.67    2.270  0.98( 0.10) 0.10      16.4     213.00
      6       36.40   11.24    2.219  0.98( 0.10) 0.10      16.8     306.00
      7       34.49   13.62    2.004  0.97( 0.10) 0.10      18.1     300.00
      8       34.45   13.66    2.001  0.97( 0.10) 0.10      18.1     303.00
      9       29.43   21.73    1.660  0.98( 0.10) 0.10      19.7     309.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      36.96    Tc(MIN.) =     9.48
  EFFECTIVE AREA(ACRES) =      15.17   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       19.7
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    326.00 =    2442.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    326.00 TO NODE    329.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1312.97  DOWNSTREAM(FEET) =  1311.92
  FLOW LENGTH(FEET) =   211.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.5 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.22
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      36.96
  PIPE TRAVEL TIME(MIN.) =   0.49    Tc(MIN.) =    9.96
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    329.00 =    2653.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    329.00 TO NODE    329.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.96
  RAINFALL INTENSITY(INCH/HR) =   2.34
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =      15.17
  TOTAL STREAM AREA(ACRES) =      19.68
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      36.96

****************************************************************************
  FLOW PROCESS FROM NODE    327.00 TO NODE    328.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1329.44  DOWNSTREAM(FEET) =   1328.65

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.051
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.241
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.05
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE    328.00 TO NODE    329.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1328.65  DOWNSTREAM(FEET) =   1327.48
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =    76.00   CHANNEL SLOPE =  0.0154
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.070
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.42      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.85
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.36
  AVERAGE FLOW DEPTH(FEET) =   0.08   TRAVEL TIME(MIN.) =   0.93
  Tc(MIN.) =    5.98
  SUBAREA AREA(ACRES) =     0.42       SUBAREA RUNOFF(CFS) =    1.12
  EFFECTIVE AREA(ACRES) =      0.52     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.5          PEAK FLOW RATE(CFS) =       1.39

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   1.58
  LONGEST FLOWPATH FROM NODE    327.00 TO NODE    329.00 =     176.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    329.00 TO NODE    329.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.98
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.070
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.42      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.42      SUBAREA RUNOFF(CFS) =    1.12
  EFFECTIVE AREA(ACRES) =      0.94   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.9       PEAK FLOW RATE(CFS) =       2.51

****************************************************************************
  FLOW PROCESS FROM NODE    329.00 TO NODE    329.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.98
```

```
 RAINFALL INTENSITY(INCH/HR) =   3.07
 AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.98
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.94
 TOTAL STREAM AREA(ACRES) =       0.94
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.51

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       30.86    6.48    2.978  0.98( 0.10) 0.10      10.0     324.00
     1       36.63    9.41    2.439  0.98( 0.10) 0.10      14.4     321.00
     1       36.96    9.96    2.337  0.98( 0.10) 0.10      15.2     318.00
     1       36.96   10.59    2.277  0.98( 0.10) 0.10      15.9     315.00
     1       36.75   11.16    2.226  0.98( 0.10) 0.10      16.4     213.00
     1       36.40   11.73    2.175  0.98( 0.10) 0.10      16.8     306.00
     1       34.49   14.13    1.959  0.97( 0.10) 0.10      18.1     300.00
     1       34.45   14.16    1.955  0.97( 0.10) 0.10      18.1     303.00
     1       29.43   22.24    1.643  0.98( 0.10) 0.10      19.7     309.00
     2        2.51    5.98    3.070  0.98( 0.10) 0.10       0.9     327.00

 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       31.91    5.98    3.070  0.98( 0.10) 0.10      10.2     327.00
     2       33.30    6.48    2.978  0.98( 0.10) 0.10      10.9     324.00
     3       38.61    9.41    2.439  0.98( 0.10) 0.10      15.4     321.00
     4       38.86    9.96    2.337  0.98( 0.10) 0.10      16.1     318.00
     5       38.81   10.59    2.277  0.98( 0.10) 0.10      16.8     315.00
     6       38.55   11.16    2.226  0.98( 0.10) 0.10      17.3     213.00
     7       38.15   11.73    2.175  0.98( 0.10) 0.10      17.8     306.00
     8       36.07   14.13    1.959  0.97( 0.10) 0.10      19.1     300.00
     9       36.02   14.16    1.955  0.97( 0.10) 0.10      19.1     303.00
    10       30.74   22.24    1.643  0.98( 0.10) 0.10      20.6     309.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      38.86    Tc(MIN.) =     9.96
 EFFECTIVE AREA(ACRES) =      16.11   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =       20.6
 LONGEST FLOWPATH FROM NODE    309.00 TO NODE    329.00 =    2653.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    329.00 TO NODE    336.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1311.92  DOWNSTREAM(FEET) =  1310.58
  FLOW LENGTH(FEET) =   272.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.25
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      38.86
  PIPE TRAVEL TIME(MIN.) =   0.63    Tc(MIN.) =   10.59
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    336.00 =    2925.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    330.00 TO NODE    331.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1358.55  DOWNSTREAM(FEET) =   1354.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.250
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE    331.00 TO NODE    332.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   1354.80  DOWNSTREAM(FEET) =   1335.24
  CHANNEL LENGTH THRU SUBAREA(FEET) =   735.00   CHANNEL SLOPE =  0.0266
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.249
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.86      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.14
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.08
  AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   5.90
  Tc(MIN.) =   10.90
  SUBAREA AREA(ACRES) =     1.86       SUBAREA RUNOFF(CFS) =    3.60
  EFFECTIVE AREA(ACRES) =      1.96     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.97  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        2.0         PEAK FLOW RATE(CFS) =       3.79

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.12   FLOW VELOCITY(FEET/SEC.) =   2.46
  LONGEST FLOWPATH FROM NODE    330.00 TO NODE    332.00 =     835.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    332.00 TO NODE    332.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.90
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.249
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.86      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.86      SUBAREA RUNOFF(CFS) =    3.60
  EFFECTIVE AREA(ACRES) =      3.82   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        3.8       PEAK FLOW RATE(CFS) =       7.40

****************************************************************************
  FLOW PROCESS FROM NODE    332.00 TO NODE    335.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1331.29  DOWNSTREAM(FEET) =  1314.57
  FLOW LENGTH(FEET) =   525.00   MANNING'S N =  0.013
```

```
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.78
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.40
  PIPE TRAVEL TIME(MIN.) =   0.89    Tc(MIN.) =   11.80
  LONGEST FLOWPATH FROM NODE    330.00 TO NODE    335.00 =    1360.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    335.00 TO NODE    335.00 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.) =   11.80
  RAINFALL INTENSITY(INCH/HR) =   2.17
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       3.82
  TOTAL STREAM AREA(ACRES) =       3.82
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.40

****************************************************************************
  FLOW PROCESS FROM NODE    333.00 TO NODE    334.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1344.12  DOWNSTREAM(FEET) =   1340.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.250
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE    334.00 TO NODE    335.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
```

```
 ELEVATION DATA: UPSTREAM(FEET) =   1340.80  DOWNSTREAM(FEET) =   1326.50
 CHANNEL LENGTH THRU SUBAREA(FEET) =   773.00   CHANNEL SLOPE =  0.0185
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.187
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        2.46      0.98     0.100    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.66
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.95
 AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   6.59
 Tc(MIN.) =   11.59
 SUBAREA AREA(ACRES) =     2.46       SUBAREA RUNOFF(CFS) =    4.63
 EFFECTIVE AREA(ACRES) =      2.56     AREA-AVERAGED Fm(INCH/HR) =   0.10
 AREA-AVERAGED Fp(INCH/HR) =   0.97  AREA-AVERAGED Ap =   0.10
 TOTAL AREA(ACRES) =        2.6         PEAK FLOW RATE(CFS) =       4.81

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.14   FLOW VELOCITY(FEET/SEC.) =   2.41
 LONGEST FLOWPATH FROM NODE    333.00 TO NODE    335.00 =     873.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    335.00 TO NODE    335.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.59
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.187
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        2.46      0.98     0.100    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    2.46      SUBAREA RUNOFF(CFS) =    4.63
 EFFECTIVE AREA(ACRES) =      5.02   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        5.0       PEAK FLOW RATE(CFS) =       9.44

****************************************************************************
 FLOW PROCESS FROM NODE    335.00 TO NODE    335.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
```

```
  TIME OF CONCENTRATION(MIN.) =   11.59
  RAINFALL INTENSITY(INCH/HR) =   2.19
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       5.02
  TOTAL STREAM AREA(ACRES) =       5.02
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.44

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        7.40   11.80    2.168  0.98( 0.10) 0.10       3.8     330.00
      2        9.44   11.59    2.187  0.97( 0.10) 0.10       5.0     333.00

  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       16.77   11.59    2.187  0.98( 0.10) 0.10       8.8     333.00
      2       16.75   11.80    2.168  0.97( 0.10) 0.10       8.8     330.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      16.77    Tc(MIN.) =    11.59
  EFFECTIVE AREA(ACRES) =       8.77   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        8.8
  LONGEST FLOWPATH FROM NODE    330.00 TO NODE    335.00 =    1360.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    335.00 TO NODE    336.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1314.57  DOWNSTREAM(FEET) =  1310.58
  FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.74
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.77
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   11.77
  LONGEST FLOWPATH FROM NODE    330.00 TO NODE    336.00 =    1485.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 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       16.77   11.77    2.171  0.98( 0.10) 0.10       8.8     333.00
      2       16.75   11.97    2.152  0.97( 0.10) 0.10       8.8     330.00
  LONGEST FLOWPATH FROM NODE    330.00 TO NODE    336.00 =    1485.00 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       31.91    6.64    2.948  0.98( 0.10) 0.10      10.2     327.00
      2       33.30    7.13    2.858  0.98( 0.10) 0.10      10.9     324.00
      3       38.61   10.03    2.327  0.98( 0.10) 0.10      15.4     321.00
      4       38.86   10.59    2.277  0.98( 0.10) 0.10      16.1     318.00
      5       38.81   11.22    2.220  0.98( 0.10) 0.10      16.8     315.00
      6       38.55   11.79    2.169  0.98( 0.10) 0.10      17.3     213.00
      7       38.15   12.35    2.118  0.98( 0.10) 0.10      17.8     306.00
      8       36.07   14.78    1.900  0.97( 0.10) 0.10      19.1     300.00
      9       36.02   14.82    1.896  0.97( 0.10) 0.10      19.1     303.00
     10       30.74   22.91    1.622  0.98( 0.10) 0.10      20.6     309.00
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    336.00 =    2925.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       44.92    6.64    2.948  0.98( 0.10) 0.10      15.1     327.00
      2       46.83    7.13    2.858  0.98( 0.10) 0.10      16.3     324.00
      3       53.99   10.03    2.327  0.98( 0.10) 0.10      22.9     321.00
      4       54.72   10.59    2.277  0.98( 0.10) 0.10      24.0     318.00
      5       55.17   11.22    2.220  0.98( 0.10) 0.10      25.2     315.00
      6       55.33   11.77    2.171  0.98( 0.10) 0.10      26.1     333.00
      7       55.32   11.79    2.169  0.98( 0.10) 0.10      26.1     213.00
      8       55.17   11.97    2.152  0.98( 0.10) 0.10      26.3     330.00
      9       54.63   12.35    2.118  0.97( 0.10) 0.10      26.6     306.00
     10       50.76   14.78    1.900  0.97( 0.10) 0.10      27.9     300.00
     11       50.69   14.82    1.896  0.97( 0.10) 0.10      27.9     303.00
     12       43.17   22.91    1.622  0.97( 0.10) 0.10      29.5     309.00
    TOTAL AREA(ACRES) =        29.5

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       55.33  Tc(MIN.) =   11.771
  EFFECTIVE AREA(ACRES) =     26.11  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       29.5
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    336.00 =    2925.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 IS CODE =  12
```

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

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    340.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1310.58  DOWNSTREAM(FEET) =  1308.10
  FLOW LENGTH(FEET) =   685.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  32.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.97
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      55.33
  PIPE TRAVEL TIME(MIN.) =   1.64    Tc(MIN.) =   13.41
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    340.00 =    3610.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    337.00 TO NODE    338.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1327.94

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.250
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.28
```

```
 TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.28

****************************************************************************
 FLOW PROCESS FROM NODE    338.00 TO NODE    339.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1327.94  DOWNSTREAM(FEET) =   1321.77
 CHANNEL LENGTH THRU SUBAREA(FEET) =   576.00   CHANNEL SLOPE =  0.0107
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.229
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        1.69      0.98     0.100    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.93
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.57
 AVERAGE FLOW DEPTH(FEET) =   0.11   TRAVEL TIME(MIN.) =   6.12
 Tc(MIN.) =   11.12
 SUBAREA AREA(ACRES) =     1.69       SUBAREA RUNOFF(CFS) =    3.24
 EFFECTIVE AREA(ACRES) =      1.79     AREA-AVERAGED Fm(INCH/HR) =   0.10
 AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
 TOTAL AREA(ACRES) =        1.8         PEAK FLOW RATE(CFS) =       3.43

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.14   FLOW VELOCITY(FEET/SEC.) =   1.77
 LONGEST FLOWPATH FROM NODE    337.00 TO NODE    339.00 =     676.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    339.00 TO NODE    339.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.12
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.229
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        1.69      0.98     0.100    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    1.69      SUBAREA RUNOFF(CFS) =    3.24
 EFFECTIVE AREA(ACRES) =      3.48   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        3.5       PEAK FLOW RATE(CFS) =       6.68
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    339.00 TO NODE    340.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1317.75  DOWNSTREAM(FEET) =  1308.10
  FLOW LENGTH(FEET) =   304.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.54
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.68
  PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =   11.65
  LONGEST FLOWPATH FROM NODE    337.00 TO NODE    340.00 =     980.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        6.68   11.65    2.181  0.97( 0.10) 0.10       3.5     337.00
  LONGEST FLOWPATH FROM NODE    337.00 TO NODE    340.00 =     980.00 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       44.92    8.36    2.631  0.98( 0.10) 0.10      15.1     327.00
      2       46.83    8.85    2.542  0.98( 0.10) 0.10      16.3     324.00
      3       53.99   11.68    2.179  0.98( 0.10) 0.10      22.9     321.00
      4       54.72   12.23    2.130  0.98( 0.10) 0.10      24.0     318.00
      5       55.17   12.86    2.073  0.98( 0.10) 0.10      25.2     315.00
      6       55.33   13.41    2.023  0.98( 0.10) 0.10      26.1     333.00
      7       55.32   13.42    2.022  0.98( 0.10) 0.10      26.1     213.00
      8       55.17   13.61    2.005  0.98( 0.10) 0.10      26.3     330.00
      9       54.63   13.99    1.971  0.97( 0.10) 0.10      26.6     306.00
     10       50.76   16.43    1.833  0.97( 0.10) 0.10      27.9     300.00
     11       50.69   16.47    1.832  0.97( 0.10) 0.10      27.9     303.00
     12       43.17   24.64    1.565  0.97( 0.10) 0.10      29.5     309.00
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    340.00 =    3610.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       50.75    8.36    2.631  0.98( 0.10) 0.10      17.6     327.00
      2       52.78    8.85    2.542  0.98( 0.10) 0.10      18.9     324.00
      3       60.60   11.65    2.181  0.98( 0.10) 0.10      26.3     337.00
```

```
     4       60.66   11.68    2.179  0.97( 0.10) 0.10      26.3     321.00
     5       61.23   12.23    2.130  0.97( 0.10) 0.10      27.5     318.00
     6       61.50   12.86    2.073  0.97( 0.10) 0.10      28.7     315.00
     7       61.50   13.41    2.023  0.97( 0.10) 0.10      29.6     333.00
     8       61.49   13.42    2.022  0.97( 0.10) 0.10      29.6     213.00
     9       61.28   13.61    2.005  0.98( 0.10) 0.10      29.8     330.00
    10       60.63   13.99    1.971  0.97( 0.10) 0.10      30.1     306.00
    11       56.32   16.43    1.833  0.97( 0.10) 0.10      31.4     300.00
    12       56.24   16.47    1.832  0.97( 0.10) 0.10      31.4     303.00
    13       47.87   24.64    1.565  0.98( 0.10) 0.10      32.9     309.00
   TOTAL AREA(ACRES) =        32.9

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       61.50  Tc(MIN.) =   12.857
  EFFECTIVE AREA(ACRES) =     28.66  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       32.9
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    340.00 =    3610.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    343.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1308.10  DOWNSTREAM(FEET) =  1305.41
  FLOW LENGTH(FEET) =   447.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  31.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.58
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      61.50
  PIPE TRAVEL TIME(MIN.) =   0.87    Tc(MIN.) =   13.73
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    343.00 =    4057.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    343.00 TO NODE    343.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    343.00 TO NODE    343.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
```

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

******************************************************************************
  FLOW PROCESS FROM NODE    341.00 TO NODE    342.00 IS CODE =  21
------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.250
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.28

******************************************************************************
  FLOW PROCESS FROM NODE    342.00 TO NODE    343.00 IS CODE =  51
------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1305.41
  CHANNEL LENGTH THRU SUBAREA(FEET) =   727.00   CHANNEL SLOPE =  0.0326
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.567
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        7.39      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.60
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.27
  AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =   3.71
  Tc(MIN.) =    8.71
  SUBAREA AREA(ACRES) =     7.39       SUBAREA RUNOFF(CFS) =   16.43
  EFFECTIVE AREA(ACRES) =      7.49     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        7.5         PEAK FLOW RATE(CFS) =      16.65

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
```

```
 DEPTH(FEET) =  0.21   FLOW VELOCITY(FEET/SEC.) =   3.86
 LONGEST FLOWPATH FROM NODE    341.00 TO NODE    343.00 =     827.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    343.00 TO NODE    343.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    8.71
 *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.567
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        7.39      0.98     0.100    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    7.39      SUBAREA RUNOFF(CFS) =   16.43
 EFFECTIVE AREA(ACRES) =     14.88   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =       14.9       PEAK FLOW RATE(CFS) =      33.08

****************************************************************************
 FLOW PROCESS FROM NODE    343.00 TO NODE    343.00 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       33.08    8.71    2.567  0.98( 0.10) 0.10      14.9     341.00
 LONGEST FLOWPATH FROM NODE    341.00 TO NODE    343.00 =     827.00 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       50.75    9.25    2.468  0.98( 0.10) 0.10      17.6     327.00
     2       52.78    9.73    2.379  0.98( 0.10) 0.10      18.9     324.00
     3       60.60   12.52    2.103  0.98( 0.10) 0.10      26.3     337.00
     4       60.66   12.54    2.101  0.97( 0.10) 0.10      26.3     321.00
     5       61.23   13.10    2.051  0.97( 0.10) 0.10      27.5     318.00
     6       61.50   13.73    1.995  0.97( 0.10) 0.10      28.7     315.00
     7       61.50   14.28    1.945  0.97( 0.10) 0.10      29.6     333.00
     8       61.49   14.29    1.944  0.97( 0.10) 0.10      29.6     213.00
     9       61.28   14.48    1.927  0.98( 0.10) 0.10      29.8     330.00
    10       60.63   14.86    1.892  0.97( 0.10) 0.10      30.1     306.00
    11       56.32   17.31    1.805  0.97( 0.10) 0.10      31.4     300.00
    12       56.24   17.35    1.803  0.97( 0.10) 0.10      31.4     303.00
    13       47.87   25.55    1.535  0.98( 0.10) 0.10      32.9     309.00
 LONGEST FLOWPATH FROM NODE    309.00 TO NODE    343.00 =    4057.00 FEET.
```

```
 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       82.87    8.71    2.567  0.98( 0.10) 0.10      31.5     341.00
     2       82.49    9.25    2.468  0.98( 0.10) 0.10      32.5     327.00
     3       83.34    9.73    2.379  0.98( 0.10) 0.10      33.8     324.00
     4       87.46   12.52    2.103  0.98( 0.10) 0.10      41.2     337.00
     5       87.49   12.54    2.101  0.98( 0.10) 0.10      41.2     321.00
     6       87.40   13.10    2.051  0.98( 0.10) 0.10      42.4     318.00
     7       86.91   13.73    1.995  0.98( 0.10) 0.10      43.5     315.00
     8       86.24   14.28    1.945  0.98( 0.10) 0.10      44.5     333.00
     9       86.21   14.29    1.944  0.97( 0.10) 0.10      44.5     213.00
    10       85.78   14.48    1.927  0.98( 0.10) 0.10      44.7     330.00
    11       84.67   14.86    1.892  0.98( 0.10) 0.10      45.0     306.00
    12       79.18   17.31    1.805  0.97( 0.10) 0.10      46.3     300.00
    13       79.09   17.35    1.803  0.97( 0.10) 0.10      46.3     303.00
    14       67.12   25.55    1.535  0.98( 0.10) 0.10      47.8     309.00
   TOTAL AREA(ACRES) =        47.8

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       87.49  Tc(MIN.) =   12.544
  EFFECTIVE AREA(ACRES) =     41.23  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       47.8
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    343.00 =    4057.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    343.00 TO NODE    343.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    401.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1331.99  DOWNSTREAM(FEET) =   1330.99

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.250
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    402.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1330.99  DOWNSTREAM(FEET) =   1325.67
  CHANNEL LENGTH THRU SUBAREA(FEET) =   612.00   CHANNEL SLOPE =  0.0087
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.185
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        2.28      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.46
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.54
  AVERAGE FLOW DEPTH(FEET) =   0.13   TRAVEL TIME(MIN.) =   6.61
  Tc(MIN.) =   11.61
  SUBAREA AREA(ACRES) =     2.28       SUBAREA RUNOFF(CFS) =    4.28
  EFFECTIVE AREA(ACRES) =      2.38     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.97  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        2.4          PEAK FLOW RATE(CFS) =       4.47

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   1.70
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    402.00 =     712.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    402.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.61
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.185
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        2.28      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    2.28      SUBAREA RUNOFF(CFS) =    4.28
  EFFECTIVE AREA(ACRES) =      4.66   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.10
```

```
  TOTAL AREA(ACRES) =        4.7       PEAK FLOW RATE(CFS) =       8.75

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    406.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1322.57  DOWNSTREAM(FEET) =  1310.63
  FLOW LENGTH(FEET) =    22.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   4.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  29.50
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.75
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   11.62
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    406.00 =     734.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    406.00 TO NODE    406.00 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.) =   11.62
  RAINFALL INTENSITY(INCH/HR) =   2.18
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       4.66
  TOTAL STREAM AREA(ACRES) =       4.66
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       8.75

****************************************************************************
  FLOW PROCESS FROM NODE    403.00 TO NODE    404.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1333.09  DOWNSTREAM(FEET) =   1327.13

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.250
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE    404.00 TO NODE    405.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1327.13  DOWNSTREAM(FEET) =   1314.38
  CHANNEL LENGTH THRU SUBAREA(FEET) =   506.00   CHANNEL SLOPE =  0.0252
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.331
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.43      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.72
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.69
  AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   5.00
  Tc(MIN.) =   10.00
  SUBAREA AREA(ACRES) =     0.43       SUBAREA RUNOFF(CFS) =    0.86
  EFFECTIVE AREA(ACRES) =      0.53     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.5         PEAK FLOW RATE(CFS) =       1.07

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.08   FLOW VELOCITY(FEET/SEC.) =   1.72
  LONGEST FLOWPATH FROM NODE    403.00 TO NODE    405.00 =     606.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    405.00 TO NODE    405.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.00
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.331
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.43      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.43      SUBAREA RUNOFF(CFS) =    0.86
  EFFECTIVE AREA(ACRES) =      0.96   AREA-AVERAGED Fm(INCH/HR) =  0.10
```

```
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        1.0       PEAK FLOW RATE(CFS) =       1.93

****************************************************************************
 FLOW PROCESS FROM NODE    405.00 TO NODE    406.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1310.90  DOWNSTREAM(FEET) =  1310.63
 FLOW LENGTH(FEET) =    54.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.47
 ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       1.93
 PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =   10.26
 LONGEST FLOWPATH FROM NODE    403.00 TO NODE    406.00 =     660.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    406.00 TO NODE    406.00 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.) =   10.26
 RAINFALL INTENSITY(INCH/HR) =   2.31
 AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.98
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       0.96
 TOTAL STREAM AREA(ACRES) =       0.96
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.93

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        8.75   11.62    2.184  0.97( 0.10) 0.10       4.7     400.00
     2        1.93   10.26    2.307  0.98( 0.10) 0.10       1.0     403.00

 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       10.11   10.26    2.307  0.98( 0.10) 0.10       5.1     403.00
     2       10.58   11.62    2.184  0.97( 0.10) 0.10       5.6     400.00
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      10.58    Tc(MIN.) =    11.62
  EFFECTIVE AREA(ACRES) =       5.62   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        5.6
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    406.00 =     734.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    406.00 TO NODE    410.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1310.63  DOWNSTREAM(FEET) =  1309.86
  FLOW LENGTH(FEET) =   154.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.17
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.58
  PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =   12.12
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    410.00 =     888.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 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.) =   12.12
  RAINFALL INTENSITY(INCH/HR) =   2.14
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       5.62
  TOTAL STREAM AREA(ACRES) =       5.62
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      10.58

****************************************************************************
  FLOW PROCESS FROM NODE    407.00 TO NODE    408.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1333.09  DOWNSTREAM(FEET) =   1329.82

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.250
```

```
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE    408.00 TO NODE    409.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.82  DOWNSTREAM(FEET) =   1325.77
  CHANNEL LENGTH THRU SUBAREA(FEET) =    84.00   CHANNEL SLOPE =  0.0482
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.108
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.13      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.46
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.82
  AVERAGE FLOW DEPTH(FEET) =   0.05   TRAVEL TIME(MIN.) =   0.77
  Tc(MIN.) =    5.77
  SUBAREA AREA(ACRES) =     0.13       SUBAREA RUNOFF(CFS) =    0.35
  EFFECTIVE AREA(ACRES) =      0.23     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.2          PEAK FLOW RATE(CFS) =       0.62

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   1.99
  LONGEST FLOWPATH FROM NODE    407.00 TO NODE    409.00 =     184.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    409.00 TO NODE    409.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.77
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.108
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.13      0.98     0.100    32
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.13      SUBAREA RUNOFF(CFS) =    0.35
  EFFECTIVE AREA(ACRES) =      0.36   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.4       PEAK FLOW RATE(CFS) =       0.98

****************************************************************************
  FLOW PROCESS FROM NODE    409.00 TO NODE    410.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1322.82  DOWNSTREAM(FEET) =  1309.86
  FLOW LENGTH(FEET) =    22.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   1.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.07
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.98
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    5.79
  LONGEST FLOWPATH FROM NODE    407.00 TO NODE    410.00 =     206.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.79
  RAINFALL INTENSITY(INCH/HR) =   3.10
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.36
  TOTAL STREAM AREA(ACRES) =       0.36
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.98

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       10.11   10.75    2.262  0.98( 0.10) 0.10       5.1     403.00
      1       10.58   12.12    2.139  0.97( 0.10) 0.10       5.6     400.00
      2        0.98    5.79    3.104  0.98( 0.10) 0.10       0.4     407.00

  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        8.54    5.79    3.104  0.98( 0.10) 0.10       3.1     407.00
      2       10.81   10.75    2.262  0.98( 0.10) 0.10       5.4     403.00
      3       11.24   12.12    2.139  0.97( 0.10) 0.10       6.0     400.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      11.24    Tc(MIN.) =    12.12
  EFFECTIVE AREA(ACRES) =       5.98   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        6.0
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    410.00 =     888.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    424.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1309.86  DOWNSTREAM(FEET) =  1309.34
  FLOW LENGTH(FEET) =   103.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.42
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.24
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   12.44
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    424.00 =     991.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    424.00 TO NODE    424.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    424.00 TO NODE    424.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    411.00 TO NODE    412.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.250
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE    412.00 TO NODE    413.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1328.53
  CHANNEL LENGTH THRU SUBAREA(FEET) =   202.00   CHANNEL SLOPE =  0.0028
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.530
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.99      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.37
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.86
  AVERAGE FLOW DEPTH(FEET) =   0.13   TRAVEL TIME(MIN.) =   3.91
  Tc(MIN.) =    8.91
  SUBAREA AREA(ACRES) =     0.99       SUBAREA RUNOFF(CFS) =    2.17
  EFFECTIVE AREA(ACRES) =      1.09     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =       2.39

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   0.97
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    413.00 =     302.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    413.00 TO NODE    413.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.91
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.530
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  A        0.99      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.99      SUBAREA RUNOFF(CFS) =    2.17
  EFFECTIVE AREA(ACRES) =      2.08   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.1       PEAK FLOW RATE(CFS) =       4.55

****************************************************************************
  FLOW PROCESS FROM NODE    413.00 TO NODE    416.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1323.25  DOWNSTREAM(FEET) =  1321.34
  FLOW LENGTH(FEET) =   208.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.40
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.55
  PIPE TRAVEL TIME(MIN.) =   0.64    Tc(MIN.) =    9.56
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    416.00 =     510.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    416.00 TO NODE    416.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.56
  RAINFALL INTENSITY(INCH/HR) =   2.41
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       2.08
  TOTAL STREAM AREA(ACRES) =       2.08
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.55

****************************************************************************
  FLOW PROCESS FROM NODE    414.00 TO NODE    415.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.250
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE    415.00 TO NODE    416.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1328.53
  CHANNEL LENGTH THRU SUBAREA(FEET) =   203.00   CHANNEL SLOPE =  0.0028
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.525
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.99      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.37
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.86
  AVERAGE FLOW DEPTH(FEET) =   0.13   TRAVEL TIME(MIN.) =   3.94
  Tc(MIN.) =    8.94
  SUBAREA AREA(ACRES) =     0.99       SUBAREA RUNOFF(CFS) =    2.16
  EFFECTIVE AREA(ACRES) =      1.09     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =       2.38

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   0.97
  LONGEST FLOWPATH FROM NODE    414.00 TO NODE    416.00 =     303.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    416.00 TO NODE    416.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.94
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.525
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  A        0.99      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.99      SUBAREA RUNOFF(CFS) =    2.16
  EFFECTIVE AREA(ACRES) =      2.08   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.1       PEAK FLOW RATE(CFS) =       4.55

****************************************************************************
  FLOW PROCESS FROM NODE    416.00 TO NODE    416.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.94
  RAINFALL INTENSITY(INCH/HR) =   2.53
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       2.08
  TOTAL STREAM AREA(ACRES) =       2.08
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.55

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        4.55    9.56    2.412  0.98( 0.10) 0.10       2.1     411.00
      2        4.55    8.94    2.525  0.98( 0.10) 0.10       2.1     414.00

  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        9.01    8.94    2.525  0.98( 0.10) 0.10       4.0     414.00
      2        8.89    9.56    2.412  0.98( 0.10) 0.10       4.2     411.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       9.01    Tc(MIN.) =     8.94
  EFFECTIVE AREA(ACRES) =       4.03   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        4.2
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    416.00 =     510.00 FEET.

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

```
  FLOW PROCESS FROM NODE    416.00 TO NODE    419.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1321.34  DOWNSTREAM(FEET) =  1319.26
  FLOW LENGTH(FEET) =   209.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.53
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.01
  PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =    9.47
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    419.00 =     719.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    419.00 TO NODE    419.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.47
  RAINFALL INTENSITY(INCH/HR) =   2.43
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       4.03
  TOTAL STREAM AREA(ACRES) =       4.16
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.01

****************************************************************************
  FLOW PROCESS FROM NODE    417.00 TO NODE    418.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.250
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.28
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    418.00 TO NODE    419.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1328.53
  CHANNEL LENGTH THRU SUBAREA(FEET) =   193.00   CHANNEL SLOPE =  0.0029
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.555
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.83      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.20
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.85
  AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   3.78
  Tc(MIN.) =    8.78
  SUBAREA AREA(ACRES) =     0.83       SUBAREA RUNOFF(CFS) =    1.84
  EFFECTIVE AREA(ACRES) =      0.93     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.9         PEAK FLOW RATE(CFS) =       2.06

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.15   FLOW VELOCITY(FEET/SEC.) =   0.95
  LONGEST FLOWPATH FROM NODE    417.00 TO NODE    419.00 =     293.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    419.00 TO NODE    419.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.78
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.555
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.83      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.83      SUBAREA RUNOFF(CFS) =    1.84
  EFFECTIVE AREA(ACRES) =      1.76   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.8       PEAK FLOW RATE(CFS) =       3.89

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

```
 FLOW PROCESS FROM NODE    419.00 TO NODE    419.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    8.78
 RAINFALL INTENSITY(INCH/HR) =   2.55
 AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.98
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       1.76
 TOTAL STREAM AREA(ACRES) =       1.76
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.89

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1        9.01    9.47    2.427  0.98( 0.10) 0.10       4.0     414.00
     1        8.89   10.09    2.322  0.98( 0.10) 0.10       4.2     411.00
     2        3.89    8.78    2.555  0.98( 0.10) 0.10       1.8     417.00

 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       12.70    8.78    2.555  0.98( 0.10) 0.10       5.5     417.00
     2       12.70    9.47    2.427  0.98( 0.10) 0.10       5.8     414.00
     3       12.41   10.09    2.322  0.98( 0.10) 0.10       5.9     411.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      12.70    Tc(MIN.) =     9.47
 EFFECTIVE AREA(ACRES) =       5.79   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        5.9
 LONGEST FLOWPATH FROM NODE    411.00 TO NODE    419.00 =     719.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    419.00 TO NODE    423.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1319.26  DOWNSTREAM(FEET) =  1310.69
 FLOW LENGTH(FEET) =   607.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.23
```

```
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.70
  PIPE TRAVEL TIME(MIN.) =   1.23    Tc(MIN.) =   10.70
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    423.00 =    1326.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    423.00 TO NODE    423.00 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.) =   10.70
  RAINFALL INTENSITY(INCH/HR) =   2.27
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       5.79
  TOTAL STREAM AREA(ACRES) =       5.92
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      12.70

****************************************************************************
  FLOW PROCESS FROM NODE    420.00 TO NODE    421.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1333.33  DOWNSTREAM(FEET) =   1330.07

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.250
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE    421.00 TO NODE    422.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1330.07  DOWNSTREAM(FEET) =   1326.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   168.00   CHANNEL SLOPE =  0.0189
```

```
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.890
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.26      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.61
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.43
  AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   1.96
  Tc(MIN.) =    6.96
  SUBAREA AREA(ACRES) =     0.26       SUBAREA RUNOFF(CFS) =    0.65
  EFFECTIVE AREA(ACRES) =      0.36     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.4         PEAK FLOW RATE(CFS) =       0.90

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.08   FLOW VELOCITY(FEET/SEC.) =   1.46
  LONGEST FLOWPATH FROM NODE    420.00 TO NODE    422.00 =     268.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    422.00 TO NODE    422.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.96
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.890
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.26      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.26      SUBAREA RUNOFF(CFS) =    0.65
  EFFECTIVE AREA(ACRES) =      0.62   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.6       PEAK FLOW RATE(CFS) =       1.56

****************************************************************************
  FLOW PROCESS FROM NODE    422.00 TO NODE    423.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1324.00  DOWNSTREAM(FEET) =  1310.69
  FLOW LENGTH(FEET) =    22.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   2.0 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.68
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.56
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    6.98
  LONGEST FLOWPATH FROM NODE    420.00 TO NODE    423.00 =     290.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    423.00 TO NODE    423.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.98
  RAINFALL INTENSITY(INCH/HR) =   2.89
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.62
  TOTAL STREAM AREA(ACRES) =       0.62
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.56

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       12.70   10.01    2.329  0.98( 0.10) 0.10       5.5     417.00
      1       12.70   10.70    2.267  0.98( 0.10) 0.10       5.8     414.00
      1       12.41   11.33    2.211  0.98( 0.10) 0.10       5.9     411.00
      2        1.56    6.98    2.886  0.98( 0.10) 0.10       0.6     420.00

  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       12.63    6.98    2.886  0.98( 0.10) 0.10       4.4     420.00
      2       13.95   10.01    2.329  0.98( 0.10) 0.10       6.1     417.00
      3       13.92   10.70    2.267  0.98( 0.10) 0.10       6.4     414.00
      4       13.59   11.33    2.211  0.98( 0.10) 0.10       6.5     411.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      13.95    Tc(MIN.) =    10.01
  EFFECTIVE AREA(ACRES) =       6.11   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        6.5
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    423.00 =    1326.00 FEET.

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

```
 FLOW PROCESS FROM NODE    423.00 TO NODE    424.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1310.69  DOWNSTREAM(FEET) =  1309.34
 FLOW LENGTH(FEET) =    38.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.90
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      13.95
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   10.06
 LONGEST FLOWPATH FROM NODE    411.00 TO NODE    424.00 =    1364.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    424.00 TO NODE    424.00 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       12.63    7.03    2.876  0.98( 0.10) 0.10       4.4     420.00
     2       13.95   10.06    2.325  0.98( 0.10) 0.10       6.1     417.00
     3       13.92   10.75    2.262  0.98( 0.10) 0.10       6.4     414.00
     4       13.59   11.38    2.206  0.98( 0.10) 0.10       6.5     411.00
 LONGEST FLOWPATH FROM NODE    411.00 TO NODE    424.00 =    1364.00 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        8.54    6.13    3.042  0.98( 0.10) 0.10       3.1     407.00
     2       10.81   11.08    2.232  0.98( 0.10) 0.10       5.4     403.00
     3       11.24   12.44    2.111  0.97( 0.10) 0.10       6.0     400.00
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    424.00 =     991.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       20.21    6.13    3.042  0.98( 0.10) 0.10       7.0     407.00
     2       21.58    7.03    2.876  0.98( 0.10) 0.10       8.0     420.00
     3       24.29   10.06    2.325  0.98( 0.10) 0.10      11.1     417.00
     4       24.58   10.75    2.262  0.98( 0.10) 0.10      11.7     414.00
     5       24.56   11.08    2.232  0.98( 0.10) 0.10      11.9     403.00
     6       24.49   11.38    2.206  0.98( 0.10) 0.10      12.1     411.00
     7       24.21   12.44    2.111  0.98( 0.10) 0.10      12.5     400.00
   TOTAL AREA(ACRES) =        12.5

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
```

```
  PEAK FLOW RATE(CFS) =       24.58  Tc(MIN.) =   10.753
  EFFECTIVE AREA(ACRES) =     11.68  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       12.5
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    424.00 =    1364.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    424.00 TO NODE    424.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    424.00 TO NODE    431.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1309.34  DOWNSTREAM(FEET) =  1302.92
  FLOW LENGTH(FEET) =   310.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.16
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      24.58
  PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =   11.22
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    431.00 =    1674.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    431.00 TO NODE    431.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    431.00 TO NODE    431.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    425.00 TO NODE    426.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.13

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
```

```
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.250
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE    426.00 TO NODE    427.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.13  DOWNSTREAM(FEET) =   1312.52
  CHANNEL LENGTH THRU SUBAREA(FEET) =   402.00   CHANNEL SLOPE =  0.0413
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.697
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.73      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.13
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.23
  AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   3.01
  Tc(MIN.) =    8.01
  SUBAREA AREA(ACRES) =     0.73       SUBAREA RUNOFF(CFS) =    1.71
  EFFECTIVE AREA(ACRES) =      0.83     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.97  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.8         PEAK FLOW RATE(CFS) =       1.94

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   2.49
  LONGEST FLOWPATH FROM NODE    425.00 TO NODE    427.00 =     502.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    427.00 TO NODE    427.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.01
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.697
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  COMMERCIAL                  A        0.73      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.73      SUBAREA RUNOFF(CFS) =    1.71
  EFFECTIVE AREA(ACRES) =      1.56   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.6       PEAK FLOW RATE(CFS) =       3.65

****************************************************************************
  FLOW PROCESS FROM NODE    427.00 TO NODE    430.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1309.00  DOWNSTREAM(FEET) =  1305.31
  FLOW LENGTH(FEET) =   191.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   7.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.75
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.65
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =    8.48
  LONGEST FLOWPATH FROM NODE    425.00 TO NODE    430.00 =     693.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    430.00 TO NODE    430.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.48
  RAINFALL INTENSITY(INCH/HR) =   2.61
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.56
  TOTAL STREAM AREA(ACRES) =       1.56
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.65

****************************************************************************
  FLOW PROCESS FROM NODE    428.00 TO NODE    429.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1322.64  DOWNSTREAM(FEET) =   1318.64

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
```

```
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.250
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE    429.00 TO NODE    430.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1318.64  DOWNSTREAM(FEET) =   1314.94
  CHANNEL LENGTH THRU SUBAREA(FEET) =   138.00   CHANNEL SLOPE =  0.0268
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.981
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.09      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.40
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.57
  AVERAGE FLOW DEPTH(FEET) =   0.05   TRAVEL TIME(MIN.) =   1.46
  Tc(MIN.) =    6.46
  SUBAREA AREA(ACRES) =     0.09       SUBAREA RUNOFF(CFS) =    0.23
  EFFECTIVE AREA(ACRES) =      0.19     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.97  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.2         PEAK FLOW RATE(CFS) =       0.49

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   1.47
  LONGEST FLOWPATH FROM NODE    428.00 TO NODE    430.00 =     238.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    430.00 TO NODE    430.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.46
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.981
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  COMMERCIAL                  A        0.09      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.09      SUBAREA RUNOFF(CFS) =    0.23
  EFFECTIVE AREA(ACRES) =      0.28   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.3       PEAK FLOW RATE(CFS) =       0.73

****************************************************************************
  FLOW PROCESS FROM NODE    430.00 TO NODE    430.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.46
  RAINFALL INTENSITY(INCH/HR) =   2.98
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.28
  TOTAL STREAM AREA(ACRES) =       0.28
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.73

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        3.65    8.48    2.610  0.97( 0.10) 0.10       1.6     425.00
      2        0.73    6.46    2.981  0.97( 0.10) 0.10       0.3     428.00

  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        3.92    6.46    2.981  0.97( 0.10) 0.10       1.5     428.00
      2        4.28    8.48    2.610  0.97( 0.10) 0.10       1.8     425.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       4.28    Tc(MIN.) =     8.48
  EFFECTIVE AREA(ACRES) =       1.84   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.8
  LONGEST FLOWPATH FROM NODE    425.00 TO NODE    430.00 =     693.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    430.00 TO NODE    431.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1305.31  DOWNSTREAM(FEET) =  1302.92
  FLOW LENGTH(FEET) =   124.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   8.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.94
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.28
  PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =    8.78
  LONGEST FLOWPATH FROM NODE    425.00 TO NODE    431.00 =     817.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    431.00 TO NODE    431.00 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        3.92    6.76    2.926  0.97( 0.10) 0.10       1.5     428.00
      2        4.28    8.78    2.555  0.97( 0.10) 0.10       1.8     425.00
  LONGEST FLOWPATH FROM NODE    425.00 TO NODE    431.00 =     817.00 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       20.21    6.63    2.951  0.98( 0.10) 0.10       7.0     407.00
      2       21.58    7.52    2.786  0.98( 0.10) 0.10       8.0     420.00
      3       24.29   10.52    2.283  0.98( 0.10) 0.10      11.1     417.00
      4       24.58   11.22    2.221  0.98( 0.10) 0.10      11.7     414.00
      5       24.56   11.55    2.191  0.98( 0.10) 0.10      11.9     403.00
      6       24.49   11.84    2.164  0.98( 0.10) 0.10      12.1     411.00
      7       24.21   12.90    2.069  0.98( 0.10) 0.10      12.5     400.00
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    431.00 =    1674.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       24.08    6.63    2.951  0.97( 0.10) 0.10       8.4     407.00
      2       24.33    6.76    2.926  0.98( 0.10) 0.10       8.6     428.00
      3       25.63    7.52    2.786  0.98( 0.10) 0.10       9.6     420.00
      4       26.99    8.78    2.555  0.98( 0.10) 0.10      11.1     425.00
      5       28.10   10.52    2.283  0.98( 0.10) 0.10      12.9     417.00
      6       28.27   11.22    2.221  0.98( 0.10) 0.10      13.5     414.00
      7       28.20   11.55    2.191  0.98( 0.10) 0.10      13.7     403.00
      8       28.10   11.84    2.164  0.98( 0.10) 0.10      13.9     411.00
      9       27.65   12.90    2.069  0.98( 0.10) 0.10      14.4     400.00
    TOTAL AREA(ACRES) =        14.4
```

```
  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       28.27  Tc(MIN.) =   11.216
  EFFECTIVE AREA(ACRES) =     13.52  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       14.4
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    431.00 =    1674.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    431.00 TO NODE    431.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    431.00 TO NODE    437.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1302.92  DOWNSTREAM(FEET) =  1294.50
  FLOW LENGTH(FEET) =   379.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.77
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      28.27
  PIPE TRAVEL TIME(MIN.) =   0.54    Tc(MIN.) =   11.75
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    437.00 =    2053.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    437.00 TO NODE    437.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    437.00 TO NODE    437.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    432.00 TO NODE    433.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1334.00  DOWNSTREAM(FEET) =   1333.15
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.250
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE    433.00 TO NODE    434.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1333.15  DOWNSTREAM(FEET) =   1299.66
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2503.00   CHANNEL SLOPE =  0.0134
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.388
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        2.63      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.98
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.66
  AVERAGE FLOW DEPTH(FEET) =   0.11   TRAVEL TIME(MIN.) =  25.13
  Tc(MIN.) =   30.13
  SUBAREA AREA(ACRES) =     2.63       SUBAREA RUNOFF(CFS) =    3.06
  EFFECTIVE AREA(ACRES) =      2.73     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        2.7         PEAK FLOW RATE(CFS) =       3.17

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   1.82
  LONGEST FLOWPATH FROM NODE    432.00 TO NODE    434.00 =    2603.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    434.00 TO NODE    434.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   30.13
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.388
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
   DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  A        2.63      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    2.63      SUBAREA RUNOFF(CFS) =    3.06
  EFFECTIVE AREA(ACRES) =      5.36   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =       6.23

****************************************************************************
  FLOW PROCESS FROM NODE    434.00 TO NODE    437.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1295.87  DOWNSTREAM(FEET) =  1294.50
  FLOW LENGTH(FEET) =   275.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.60
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.23
  PIPE TRAVEL TIME(MIN.) =   1.00    Tc(MIN.) =   31.12
  LONGEST FLOWPATH FROM NODE    432.00 TO NODE    437.00 =    2878.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    437.00 TO NODE    437.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        6.23   31.12    1.376  0.98( 0.10) 0.10       5.4     432.00
  LONGEST FLOWPATH FROM NODE    432.00 TO NODE    437.00 =    2878.00 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       24.08    7.18    2.849  0.97( 0.10) 0.10       8.4     407.00
      2       24.33    7.31    2.824  0.98( 0.10) 0.10       8.6     428.00
      3       25.63    8.07    2.685  0.98( 0.10) 0.10       9.6     420.00
      4       26.99    9.32    2.456  0.98( 0.10) 0.10      11.1     425.00
      5       28.10   11.06    2.235  0.98( 0.10) 0.10      12.9     417.00
      6       28.27   11.75    2.172  0.98( 0.10) 0.10      13.5     414.00
      7       28.20   12.08    2.142  0.98( 0.10) 0.10      13.7     403.00
      8       28.10   12.38    2.116  0.98( 0.10) 0.10      13.9     411.00
      9       27.65   13.44    2.020  0.98( 0.10) 0.10      14.4     400.00
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    437.00 =    2053.00 FEET.
```

```
  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       27.17    7.18    2.849  0.98( 0.10) 0.10       9.6     407.00
      2       27.45    7.31    2.824  0.98( 0.10) 0.10       9.9     428.00
      3       28.90    8.07    2.685  0.98( 0.10) 0.10      11.0     420.00
      4       30.43    9.32    2.456  0.98( 0.10) 0.10      12.7     425.00
      5       31.80   11.06    2.235  0.98( 0.10) 0.10      14.8     417.00
      6       32.09   11.75    2.172  0.98( 0.10) 0.10      15.5     414.00
      7       32.07   12.08    2.142  0.98( 0.10) 0.10      15.8     403.00
      8       32.01   12.38    2.116  0.98( 0.10) 0.10      16.1     411.00
      9       31.69   13.44    2.020  0.98( 0.10) 0.10      16.7     400.00
     10       24.61   31.12    1.376  0.98( 0.10) 0.10      19.7     432.00
    TOTAL AREA(ACRES) =        19.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       32.09  Tc(MIN.) =   11.753
  EFFECTIVE AREA(ACRES) =     15.54  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       19.7
  LONGEST FLOWPATH FROM NODE    432.00 TO NODE    437.00 =    2878.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    437.00 TO NODE    437.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    437.00 TO NODE    437.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    437.00 TO NODE    437.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    435.00 TO NODE    436.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1328.83  DOWNSTREAM(FEET) =   1322.08
```

```
  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.250
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE    436.00 TO NODE    437.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1322.08  DOWNSTREAM(FEET) =   1294.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   568.00   CHANNEL SLOPE =  0.0486
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.690
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        2.59      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.33
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.11
  AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   3.05
  Tc(MIN.) =    8.05
  SUBAREA AREA(ACRES) =     2.59       SUBAREA RUNOFF(CFS) =    6.04
  EFFECTIVE AREA(ACRES) =      2.69     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        2.7         PEAK FLOW RATE(CFS) =       6.28

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   3.61
  LONGEST FLOWPATH FROM NODE    435.00 TO NODE    437.00 =     668.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    437.00 TO NODE    437.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.05
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  2.690
  SUBAREA LOSS RATE DATA(AMC  II):
```

```
 DEVELOPMENT TYPE/       SCS SOIL   AREA      Fp         Ap      SCS
     LAND USE             GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        2.59      0.98     0.100    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    2.59      SUBAREA RUNOFF(CFS) =    6.04
 EFFECTIVE AREA(ACRES) =      5.28   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        5.3       PEAK FLOW RATE(CFS) =      12.32

****************************************************************************
 FLOW PROCESS FROM NODE    437.00 TO NODE    437.00 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       12.32    8.05    2.690  0.98( 0.10) 0.10       5.3     435.00
 LONGEST FLOWPATH FROM NODE    435.00 TO NODE    437.00 =     668.00 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       27.17    7.18    2.849  0.98( 0.10) 0.10       9.6     407.00
     2       27.45    7.31    2.824  0.98( 0.10) 0.10       9.9     428.00
     3       28.90    8.07    2.685  0.98( 0.10) 0.10      11.0     420.00
     4       30.43    9.32    2.456  0.98( 0.10) 0.10      12.7     425.00
     5       31.80   11.06    2.235  0.98( 0.10) 0.10      14.8     417.00
     6       32.09   11.75    2.172  0.98( 0.10) 0.10      15.5     414.00
     7       32.07   12.08    2.142  0.98( 0.10) 0.10      15.8     403.00
     8       32.01   12.38    2.116  0.98( 0.10) 0.10      16.1     411.00
     9       31.69   13.44    2.020  0.98( 0.10) 0.10      16.7     400.00
    10       24.61   31.12    1.376  0.98( 0.10) 0.10      19.7     432.00
 LONGEST FLOWPATH FROM NODE    432.00 TO NODE    437.00 =    2878.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       38.84    7.18    2.849  0.98( 0.10) 0.10      14.4     407.00
     2       39.23    7.31    2.824  0.98( 0.10) 0.10      14.7     428.00
     3       41.17    8.05    2.690  0.98( 0.10) 0.10      16.2     435.00
     4       41.20    8.07    2.685  0.98( 0.10) 0.10      16.2     420.00
     5       41.64    9.32    2.456  0.98( 0.10) 0.10      18.0     425.00
     6       41.95   11.06    2.235  0.98( 0.10) 0.10      20.1     417.00
     7       41.95   11.75    2.172  0.98( 0.10) 0.10      20.8     414.00
     8       41.79   12.08    2.142  0.98( 0.10) 0.10      21.1     403.00
     9       41.60   12.38    2.116  0.98( 0.10) 0.10      21.3     411.00
    10       40.83   13.44    2.020  0.98( 0.10) 0.10      22.0     400.00
```

```
     11       30.69   31.12    1.376  0.98( 0.10) 0.10      25.0     432.00
    TOTAL AREA(ACRES) =        25.0

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       41.95  Tc(MIN.) =   11.061
  EFFECTIVE AREA(ACRES) =     20.08  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       25.0
  LONGEST FLOWPATH FROM NODE    432.00 TO NODE    437.00 =    2878.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    437.00 TO NODE    437.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    500.00 TO NODE    501.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1335.00  DOWNSTREAM(FEET) =   1333.18

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  3.250
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE    501.00 TO NODE    502.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1333.18  DOWNSTREAM(FEET) =   1298.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2797.00   CHANNEL SLOPE =  0.0126
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.221
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
```

```
     LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                A        0.67      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.64
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.20
  AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =  38.74
  Tc(MIN.) =   43.74
  SUBAREA AREA(ACRES) =     0.67       SUBAREA RUNOFF(CFS) =    0.68
  EFFECTIVE AREA(ACRES) =      0.77     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.8         PEAK FLOW RATE(CFS) =       0.78

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.08   FLOW VELOCITY(FEET/SEC.) =   1.25
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    502.00 =    2897.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    502.00 TO NODE    502.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   43.74
  *  10 YEAR RAINFALL INTENSITY(INCH/HR) =  1.221
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                A        0.67      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.67      SUBAREA RUNOFF(CFS) =    0.68
  EFFECTIVE AREA(ACRES) =      1.44   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.4       PEAK FLOW RATE(CFS) =       1.46
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.4  TC(MIN.) =     43.74
  EFFECTIVE AREA(ACRES) =      1.44  AREA-AVERAGED Fm(INCH/HR)=  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap = 0.100
  PEAK FLOW RATE(CFS)   =       1.46
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```



```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        (c) Copyright 1983-2011 Advanced Engineering Software (aes)
            Ver. 18.0  Release Date: 07/01/2011  License ID 1499

                          Analysis prepared by:
```

```
 ************************ DESCRIPTION OF STUDY ************************
* 2400 HIGHLAND                                                      *
* 25 YEAR RECURRENCE INTERVAL                                        *
* PROPOSED CONDITIONS                                                *
 **********************************************************************

  FILE NAME: CARS25P.DAT
  TIME/DATE OF STUDY: 13:46 11/16/2023
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =   25.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED TABLED RAINFALL USED*
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)    5.00;  4.020
   2)   10.00;  2.880
   3)   15.00;  2.320
   4)   30.00;  1.720
   5)   60.00;  1.260
   6)  120.00;  0.878
   7)  180.00;  0.714
   8)  360.00;  0.504
   9)  720.00;  0.337
  *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 0.0312 0.167 0.0150
```

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

****************************************************************************
  FLOW PROCESS FROM NODE    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) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1371.76  DOWNSTREAM(FEET) =   1364.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.020
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.35
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.35

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1364.00  DOWNSTREAM(FEET) =   1296.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  4918.00   CHANNEL SLOPE =  0.0138
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   0.50
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  1.157
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        6.14      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.63
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.15
  AVERAGE FLOW DEPTH(FEET) =   0.18   TRAVEL TIME(MIN.) =  71.18
  Tc(MIN.) =   76.18
```

```
  SUBAREA AREA(ACRES) =     6.14       SUBAREA RUNOFF(CFS) =    5.85
  EFFECTIVE AREA(ACRES) =      6.24     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        6.2          PEAK FLOW RATE(CFS) =       5.95

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.22   FLOW VELOCITY(FEET/SEC.) =   1.28
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =    5018.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   76.18
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  1.157
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        6.14      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    6.14      SUBAREA RUNOFF(CFS) =    5.85
  EFFECTIVE AREA(ACRES) =     12.38   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       12.4       PEAK FLOW RATE(CFS) =      11.80

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1338.05  DOWNSTREAM(FEET) =   1336.33

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.020
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.35
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.35

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  51
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1336.33  DOWNSTREAM(FEET) =   1312.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   817.00   CHANNEL SLOPE =  0.0298
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.216
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A       12.52      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      18.24
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.86
  AVERAGE FLOW DEPTH(FEET) =   0.22   TRAVEL TIME(MIN.) =   3.52
  Tc(MIN.) =    8.52
  SUBAREA AREA(ACRES) =    12.52       SUBAREA RUNOFF(CFS) =   35.14
  EFFECTIVE AREA(ACRES) =     12.62     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.97  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =       12.6          PEAK FLOW RATE(CFS) =      35.42

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.28   FLOW VELOCITY(FEET/SEC.) =   4.58
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.52
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.216
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A       12.52      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   12.52      SUBAREA RUNOFF(CFS) =   35.14
  EFFECTIVE AREA(ACRES) =     25.14   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       25.1        PEAK FLOW RATE(CFS) =      70.57

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.020
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.35
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.35

********************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1328.53
  CHANNEL LENGTH THRU SUBAREA(FEET) =   201.00   CHANNEL SLOPE =  0.0028
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.158
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.98      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.72
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.89
  AVERAGE FLOW DEPTH(FEET) =   0.14   TRAVEL TIME(MIN.) =   3.78
  Tc(MIN.) =    8.78
  SUBAREA AREA(ACRES) =     0.98       SUBAREA RUNOFF(CFS) =    2.70
  EFFECTIVE AREA(ACRES) =      1.08     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =       2.97

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.17   FLOW VELOCITY(FEET/SEC.) =   1.01
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     301.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    302.00 IS CODE =  81
--------------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =    8.78
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.158
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.98      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.98      SUBAREA RUNOFF(CFS) =    2.70
  EFFECTIVE AREA(ACRES) =      2.06   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.1       PEAK FLOW RATE(CFS) =       5.67

********************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    305.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1321.02  DOWNSTREAM(FEET) =  1319.98
  FLOW LENGTH(FEET) =   208.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.53
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.67
  PIPE TRAVEL TIME(MIN.) =   0.76    Tc(MIN.) =    9.55
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    305.00 =     509.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    305.00 IS CODE =   1
--------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.55
  RAINFALL INTENSITY(INCH/HR) =   2.98
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       2.06
  TOTAL STREAM AREA(ACRES) =       2.06
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.67

********************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    304.00 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.020
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.35
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.35

********************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    305.00 IS CODE =  51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1328.71
  CHANNEL LENGTH THRU SUBAREA(FEET) =   193.00   CHANNEL SLOPE =  0.0020
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.016
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.72      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.31
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.73
  AVERAGE FLOW DEPTH(FEET) =   0.13   TRAVEL TIME(MIN.) =   4.40
  Tc(MIN.) =    9.40
  SUBAREA AREA(ACRES) =     0.72       SUBAREA RUNOFF(CFS) =    1.89
  EFFECTIVE AREA(ACRES) =      0.82     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.8         PEAK FLOW RATE(CFS) =       2.15

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   0.82
  LONGEST FLOWPATH FROM NODE    303.00 TO NODE    305.00 =     293.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    305.00 IS CODE =  81
--------------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =    9.40
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.016
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.72      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.72      SUBAREA RUNOFF(CFS) =    1.89
  EFFECTIVE AREA(ACRES) =      1.54   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.5       PEAK FLOW RATE(CFS) =       4.04

********************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    305.00 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.) =    9.40
  RAINFALL INTENSITY(INCH/HR) =   3.02
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.54
  TOTAL STREAM AREA(ACRES) =       1.54
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.04

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        5.67    9.55    2.984  0.98( 0.10) 0.10       2.1     300.00
      2        4.04    9.40    3.016  0.98( 0.10) 0.10       1.5     303.00

  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        9.70    9.40    3.016  0.98( 0.10) 0.10       3.6     303.00
      2        9.67    9.55    2.984  0.98( 0.10) 0.10       3.6     300.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       9.70    Tc(MIN.) =     9.40
  EFFECTIVE AREA(ACRES) =       3.57   AREA-AVERAGED Fm(INCH/HR) =  0.10
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        3.6
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    305.00 =     509.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    308.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1319.98  DOWNSTREAM(FEET) =  1318.94
  FLOW LENGTH(FEET) =   208.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.13
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.70
  PIPE TRAVEL TIME(MIN.) =   0.68    Tc(MIN.) =   10.08
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    308.00 =     717.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    308.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.08
  RAINFALL INTENSITY(INCH/HR) =   2.87
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       3.57
  TOTAL STREAM AREA(ACRES) =       3.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.70

****************************************************************************
  FLOW PROCESS FROM NODE    306.00 TO NODE    307.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.020
  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.)
```

```
  COMMERCIAL                  A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.35
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.35

****************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    308.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1328.18
  CHANNEL LENGTH THRU SUBAREA(FEET) =   201.00   CHANNEL SLOPE =  0.0045
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.338
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  A        1.24      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.18
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.12
  AVERAGE FLOW DEPTH(FEET) =   0.14   TRAVEL TIME(MIN.) =   2.99
  Tc(MIN.) =    7.99
  SUBAREA AREA(ACRES) =     1.24       SUBAREA RUNOFF(CFS) =    3.62
  EFFECTIVE AREA(ACRES) =      1.34     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.97  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.3         PEAK FLOW RATE(CFS) =       3.91

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.17   FLOW VELOCITY(FEET/SEC.) =   1.32
  LONGEST FLOWPATH FROM NODE    306.00 TO NODE    308.00 =     301.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    308.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.99
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.338
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  A        1.24      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.24      SUBAREA RUNOFF(CFS) =    3.62
```

```
  EFFECTIVE AREA(ACRES) =      2.58   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.6       PEAK FLOW RATE(CFS) =       7.52

****************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    308.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.99
  RAINFALL INTENSITY(INCH/HR) =   3.34
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       2.58
  TOTAL STREAM AREA(ACRES) =       2.58
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.52

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        9.70   10.08    2.871  0.98( 0.10) 0.10       3.6     303.00
      1        9.67   10.22    2.855  0.98( 0.10) 0.10       3.6     300.00
      2        7.52    7.99    3.338  0.98( 0.10) 0.10       2.6     306.00

  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       16.51    7.99    3.338  0.98( 0.10) 0.10       5.4     306.00
      2       16.14   10.08    2.871  0.98( 0.10) 0.10       6.1     303.00
      3       16.08   10.22    2.855  0.98( 0.10) 0.10       6.2     300.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      16.51    Tc(MIN.) =     7.99
  EFFECTIVE AREA(ACRES) =       5.41   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        6.2
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    308.00 =     717.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    311.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1318.94  DOWNSTREAM(FEET) =  1317.82
  FLOW LENGTH(FEET) =   224.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.93
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.51
  PIPE TRAVEL TIME(MIN.) =   0.63    Tc(MIN.) =    8.62
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    311.00 =     941.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    311.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.62
  RAINFALL INTENSITY(INCH/HR) =   3.19
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       5.41
  TOTAL STREAM AREA(ACRES) =       6.18
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      16.51

****************************************************************************
  FLOW PROCESS FROM NODE    309.00 TO NODE    310.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1352.60  DOWNSTREAM(FEET) =   1348.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.020
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.35
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.35

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    311.00 IS CODE =  51
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1348.30  DOWNSTREAM(FEET) =   1328.52
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1374.00   CHANNEL SLOPE =  0.0144
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.186
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.81      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.11
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.71
  AVERAGE FLOW DEPTH(FEET) =   0.11   TRAVEL TIME(MIN.) =  13.36
  Tc(MIN.) =   18.36
  SUBAREA AREA(ACRES) =     1.81       SUBAREA RUNOFF(CFS) =    3.40
  EFFECTIVE AREA(ACRES) =      1.91     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.97  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.9         PEAK FLOW RATE(CFS) =       3.59

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   2.01
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    311.00 =    1474.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    311.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   18.36
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.186
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.81      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.81      SUBAREA RUNOFF(CFS) =    3.40
  EFFECTIVE AREA(ACRES) =      3.72   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        3.7       PEAK FLOW RATE(CFS) =       6.99

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    311.00 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.) =   18.36
  RAINFALL INTENSITY(INCH/HR) =   2.19
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       3.72
  TOTAL STREAM AREA(ACRES) =       3.72
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.99

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       16.51    8.62    3.194  0.98( 0.10) 0.10       5.4     306.00
      1       16.14   10.71    2.800  0.98( 0.10) 0.10       6.1     303.00
      1       16.08   10.85    2.784  0.98( 0.10) 0.10       6.2     300.00
      2        6.99   18.36    2.186  0.97( 0.10) 0.10       3.7     309.00

  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       21.37    8.62    3.194  0.98( 0.10) 0.10       7.2     306.00
      2       21.42   10.71    2.800  0.98( 0.10) 0.10       8.3     303.00
      3       21.40   10.85    2.784  0.98( 0.10) 0.10       8.4     300.00
      4       19.49   18.36    2.186  0.98( 0.10) 0.10       9.9     309.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      21.42    Tc(MIN.) =    10.71
  EFFECTIVE AREA(ACRES) =       8.32   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        9.9
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    311.00 =    1474.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    314.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1317.82  DOWNSTREAM(FEET) =  1316.86
  FLOW LENGTH(FEET) =   191.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  19.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.35
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.42
```

```
  PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =   11.21
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    314.00 =    1665.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    314.00 TO NODE    314.00 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.) =   11.21
  RAINFALL INTENSITY(INCH/HR) =   2.74
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       8.32
  TOTAL STREAM AREA(ACRES) =       9.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      21.42

****************************************************************************
  FLOW PROCESS FROM NODE    213.00 TO NODE    313.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.020
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.35
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.35

****************************************************************************
  FLOW PROCESS FROM NODE    313.00 TO NODE    314.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1328.42
  CHANNEL LENGTH THRU SUBAREA(FEET) =   201.00   CHANNEL SLOPE =  0.0033
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
```

```
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.239
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.99      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.75
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.98
  AVERAGE FLOW DEPTH(FEET) =   0.13   TRAVEL TIME(MIN.) =   3.43
  Tc(MIN.) =    8.43
  SUBAREA AREA(ACRES) =     0.99       SUBAREA RUNOFF(CFS) =    2.80
  EFFECTIVE AREA(ACRES) =      1.09     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =       3.08

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.17   FLOW VELOCITY(FEET/SEC.) =   1.07
  LONGEST FLOWPATH FROM NODE    213.00 TO NODE    314.00 =     301.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    314.00 TO NODE    314.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.43
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.239
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.99      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.99      SUBAREA RUNOFF(CFS) =    2.80
  EFFECTIVE AREA(ACRES) =      2.08   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.1       PEAK FLOW RATE(CFS) =       5.88

****************************************************************************
  FLOW PROCESS FROM NODE    314.00 TO NODE    314.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.43
  RAINFALL INTENSITY(INCH/HR) =   3.24
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
```

```
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       2.08
  TOTAL STREAM AREA(ACRES) =       2.08
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.88

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       21.37    9.14    3.076  0.98( 0.10) 0.10       7.2     306.00
      1       21.42   11.21    2.744  0.98( 0.10) 0.10       8.3     303.00
      1       21.40   11.37    2.726  0.98( 0.10) 0.10       8.4     300.00
      1       19.49   18.88    2.165  0.98( 0.10) 0.10       9.9     309.00
      2        5.88    8.43    3.239  0.98( 0.10) 0.10       2.1     213.00

  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       26.66    8.43    3.239  0.98( 0.10) 0.10       8.7     213.00
      2       26.95    9.14    3.076  0.98( 0.10) 0.10       9.2     306.00
      3       26.37   11.21    2.744  0.98( 0.10) 0.10      10.4     303.00
      4       26.32   11.37    2.726  0.98( 0.10) 0.10      10.5     300.00
      5       23.36   18.88    2.165  0.98( 0.10) 0.10      12.0     309.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      26.95    Tc(MIN.) =     9.14
  EFFECTIVE AREA(ACRES) =       9.24   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       12.0
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    314.00 =    1665.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    314.00 TO NODE    317.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1316.86  DOWNSTREAM(FEET) =  1315.82
  FLOW LENGTH(FEET) =   208.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  23.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.55
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      26.95
  PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =    9.67
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    317.00 =    1873.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    317.00 TO NODE    317.00 IS CODE =   1
```

```
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.67
  RAINFALL INTENSITY(INCH/HR) =   2.96
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       9.24
  TOTAL STREAM AREA(ACRES) =      11.98
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      26.95

****************************************************************************
  FLOW PROCESS FROM NODE    315.00 TO NODE    316.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.020
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.35
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.35

****************************************************************************
  FLOW PROCESS FROM NODE    316.00 TO NODE    317.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1328.42
  CHANNEL LENGTH THRU SUBAREA(FEET) =   201.00   CHANNEL SLOPE =  0.0033
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.239
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.99      0.98     0.100    32
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.75
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.98
  AVERAGE FLOW DEPTH(FEET) =   0.13   TRAVEL TIME(MIN.) =   3.43
  Tc(MIN.) =    8.43
  SUBAREA AREA(ACRES) =     0.99       SUBAREA RUNOFF(CFS) =    2.80
  EFFECTIVE AREA(ACRES) =      1.09     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =       3.08

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.17   FLOW VELOCITY(FEET/SEC.) =   1.07
  LONGEST FLOWPATH FROM NODE    315.00 TO NODE    317.00 =     301.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    317.00 TO NODE    317.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.43
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.239
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.99      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.99      SUBAREA RUNOFF(CFS) =    2.80
  EFFECTIVE AREA(ACRES) =      2.08   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.1       PEAK FLOW RATE(CFS) =       5.88

****************************************************************************
  FLOW PROCESS FROM NODE    317.00 TO NODE    317.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.43
  RAINFALL INTENSITY(INCH/HR) =   3.24
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       2.08
  TOTAL STREAM AREA(ACRES) =       2.08
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.88
```

```
  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       26.66    8.96    3.118  0.98( 0.10) 0.10       8.7     213.00
      1       26.95    9.67    2.955  0.98( 0.10) 0.10       9.2     306.00
      1       26.37   11.74    2.685  0.98( 0.10) 0.10      10.4     303.00
      1       26.32   11.90    2.667  0.98( 0.10) 0.10      10.5     300.00
      1       23.36   19.42    2.143  0.98( 0.10) 0.10      12.0     309.00
      2        5.88    8.43    3.239  0.98( 0.10) 0.10       2.1     315.00

  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       31.97    8.43    3.239  0.98( 0.10) 0.10      10.2     315.00
      2       32.32    8.96    3.118  0.98( 0.10) 0.10      10.8     213.00
      3       32.30    9.67    2.955  0.98( 0.10) 0.10      11.3     306.00
      4       31.21   11.74    2.685  0.98( 0.10) 0.10      12.5     303.00
      5       31.13   11.90    2.667  0.98( 0.10) 0.10      12.5     300.00
      6       27.19   19.42    2.143  0.98( 0.10) 0.10      14.1     309.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      32.32    Tc(MIN.) =     8.96
  EFFECTIVE AREA(ACRES) =      10.76   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       14.1
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    317.00 =    1873.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    317.00 TO NODE    320.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1315.82  DOWNSTREAM(FEET) =  1314.78
  FLOW LENGTH(FEET) =   207.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  24.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.95
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      32.32
  PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =    9.45
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    320.00 =    2080.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    320.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
```

```
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.45
  RAINFALL INTENSITY(INCH/HR) =   3.00
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =      10.76
  TOTAL STREAM AREA(ACRES) =      14.06
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      32.32

****************************************************************************
  FLOW PROCESS FROM NODE    318.00 TO NODE    319.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.020
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.35
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.35

****************************************************************************
  FLOW PROCESS FROM NODE    319.00 TO NODE    320.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1328.42
  CHANNEL LENGTH THRU SUBAREA(FEET) =   201.00   CHANNEL SLOPE =  0.0033
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.229
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.07      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.88
```

```
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.97
  AVERAGE FLOW DEPTH(FEET) =   0.14   TRAVEL TIME(MIN.) =   3.47
  Tc(MIN.) =    8.47
  SUBAREA AREA(ACRES) =     1.07       SUBAREA RUNOFF(CFS) =    3.02
  EFFECTIVE AREA(ACRES) =      1.17     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.2         PEAK FLOW RATE(CFS) =       3.30

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.17   FLOW VELOCITY(FEET/SEC.) =   1.12
  LONGEST FLOWPATH FROM NODE    318.00 TO NODE    320.00 =     301.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    320.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.47
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.229
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.07      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.07      SUBAREA RUNOFF(CFS) =    3.02
  EFFECTIVE AREA(ACRES) =      2.24   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.2       PEAK FLOW RATE(CFS) =       6.31

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    320.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.47
  RAINFALL INTENSITY(INCH/HR) =   3.23
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       2.24
  TOTAL STREAM AREA(ACRES) =       2.24
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.31

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
```

```
     1       31.97    8.92    3.125  0.98( 0.10) 0.10      10.2     315.00
     1       32.32    9.45    3.005  0.98( 0.10) 0.10      10.8     213.00
     1       32.30   10.17    2.861  0.98( 0.10) 0.10      11.3     306.00
     1       31.21   12.24    2.629  0.98( 0.10) 0.10      12.5     303.00
     1       31.13   12.40    2.611  0.98( 0.10) 0.10      12.5     300.00
     1       27.19   19.95    2.122  0.98( 0.10) 0.10      14.1     309.00
     2        6.31    8.47    3.229  0.98( 0.10) 0.10       2.2     318.00

  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       37.69    8.47    3.229  0.98( 0.10) 0.10      12.0     318.00
     2       38.07    8.92    3.125  0.98( 0.10) 0.10      12.5     315.00
     3       38.18    9.45    3.005  0.98( 0.10) 0.10      13.0     213.00
     4       37.87   10.17    2.861  0.98( 0.10) 0.10      13.6     306.00
     5       36.32   12.24    2.629  0.98( 0.10) 0.10      14.7     303.00
     6       36.19   12.40    2.611  0.98( 0.10) 0.10      14.8     300.00
     7       31.27   19.95    2.122  0.98( 0.10) 0.10      16.3     309.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      38.18    Tc(MIN.) =     9.45
  EFFECTIVE AREA(ACRES) =      13.00   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       16.3
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    320.00 =    2080.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    323.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1314.78  DOWNSTREAM(FEET) =  1313.87
  FLOW LENGTH(FEET) =   182.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.27
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      38.18
  PIPE TRAVEL TIME(MIN.) =   0.42    Tc(MIN.) =    9.87
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    323.00 =    2262.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    323.00 TO NODE    323.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
```

```
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.87
  RAINFALL INTENSITY(INCH/HR) =   2.91
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =      13.00
  TOTAL STREAM AREA(ACRES) =      16.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      38.18

****************************************************************************
  FLOW PROCESS FROM NODE    321.00 TO NODE    322.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1349.12  DOWNSTREAM(FEET) =   1342.96

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.020
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.35
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.35

****************************************************************************
  FLOW PROCESS FROM NODE    322.00 TO NODE    323.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1342.96  DOWNSTREAM(FEET) =   1328.02
  CHANNEL LENGTH THRU SUBAREA(FEET) =   452.00   CHANNEL SLOPE =  0.0331
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.271
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.14      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.02
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.29
```

```
 AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   3.29
 Tc(MIN.) =    8.29
 SUBAREA AREA(ACRES) =     1.14       SUBAREA RUNOFF(CFS) =    3.26
 EFFECTIVE AREA(ACRES) =      1.24     AREA-AVERAGED Fm(INCH/HR) =   0.10
 AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
 TOTAL AREA(ACRES) =        1.2         PEAK FLOW RATE(CFS) =       3.54

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.12   FLOW VELOCITY(FEET/SEC.) =   2.60
 LONGEST FLOWPATH FROM NODE    321.00 TO NODE    323.00 =     552.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    323.00 TO NODE    323.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    8.29
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.271
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        1.14      0.98     0.100    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    1.14      SUBAREA RUNOFF(CFS) =    3.26
 EFFECTIVE AREA(ACRES) =      2.38   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        2.4       PEAK FLOW RATE(CFS) =       6.80

****************************************************************************
 FLOW PROCESS FROM NODE    323.00 TO NODE    323.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    8.29
 RAINFALL INTENSITY(INCH/HR) =   3.27
 AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.97
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       2.38
 TOTAL STREAM AREA(ACRES) =       2.38
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.80

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       37.69    8.89    3.133  0.98( 0.10) 0.10      12.0     318.00
```

```
     1       38.07    9.34    3.030  0.98( 0.10) 0.10      12.5     315.00
     1       38.18    9.87    2.910  0.98( 0.10) 0.10      13.0     213.00
     1       37.87   10.58    2.815  0.98( 0.10) 0.10      13.6     306.00
     1       36.32   12.68    2.580  0.98( 0.10) 0.10      14.7     303.00
     1       36.19   12.84    2.562  0.98( 0.10) 0.10      14.8     300.00
     1       31.27   20.39    2.105  0.98( 0.10) 0.10      16.3     309.00
     2        6.80    8.29    3.271  0.97( 0.10) 0.10       2.4     321.00

  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       43.53    8.29    3.271  0.98( 0.10) 0.10      13.5     321.00
     2       44.20    8.89    3.133  0.97( 0.10) 0.10      14.3     318.00
     3       44.36    9.34    3.030  0.97( 0.10) 0.10      14.9     315.00
     4       44.20    9.87    2.910  0.98( 0.10) 0.10      15.4     213.00
     5       43.69   10.58    2.815  0.98( 0.10) 0.10      15.9     306.00
     6       41.63   12.68    2.580  0.98( 0.10) 0.10      17.1     303.00
     7       41.47   12.84    2.562  0.98( 0.10) 0.10      17.2     300.00
     8       35.57   20.39    2.105  0.98( 0.10) 0.10      18.7     309.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      44.36    Tc(MIN.) =     9.34
  EFFECTIVE AREA(ACRES) =      14.86   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       18.7
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    323.00 =    2262.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    323.00 TO NODE    326.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1313.87  DOWNSTREAM(FEET) =  1312.97
  FLOW LENGTH(FEET) =   180.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  28.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.41
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      44.36
  PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =    9.75
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    326.00 =    2442.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    326.00 TO NODE    326.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
```

```
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.75
  RAINFALL INTENSITY(INCH/HR) =   2.94
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =      14.86
  TOTAL STREAM AREA(ACRES) =      18.68
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      44.36

****************************************************************************
  FLOW PROCESS FROM NODE    324.00 TO NODE    325.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1331.16  DOWNSTREAM(FEET) =   1328.79

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.020
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.35
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.35

****************************************************************************
  FLOW PROCESS FROM NODE    325.00 TO NODE    326.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1328.79  DOWNSTREAM(FEET) =   1327.69
  CHANNEL LENGTH THRU SUBAREA(FEET) =    79.00   CHANNEL SLOPE =  0.0139
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.818
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.45      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.11
```

```
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.48
  AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   0.89
  Tc(MIN.) =    5.89
  SUBAREA AREA(ACRES) =     0.45       SUBAREA RUNOFF(CFS) =    1.51
  EFFECTIVE AREA(ACRES) =      0.55     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.6         PEAK FLOW RATE(CFS) =       1.84

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.10   FLOW VELOCITY(FEET/SEC.) =   1.72
  LONGEST FLOWPATH FROM NODE    324.00 TO NODE    326.00 =     179.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    326.00 TO NODE    326.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.89
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.818
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.45      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.45      SUBAREA RUNOFF(CFS) =    1.51
  EFFECTIVE AREA(ACRES) =      1.00   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.0       PEAK FLOW RATE(CFS) =       3.35

****************************************************************************
  FLOW PROCESS FROM NODE    326.00 TO NODE    326.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.89
  RAINFALL INTENSITY(INCH/HR) =   3.82
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.00
  TOTAL STREAM AREA(ACRES) =       1.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.35

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
```

```
     1       43.53    8.69    3.178  0.98( 0.10) 0.10      13.5     321.00
     1       44.20    9.29    3.041  0.97( 0.10) 0.10      14.3     318.00
     1       44.36    9.75    2.938  0.97( 0.10) 0.10      14.9     315.00
     1       44.20   10.27    2.849  0.98( 0.10) 0.10      15.4     213.00
     1       43.69   10.99    2.769  0.98( 0.10) 0.10      15.9     306.00
     1       41.63   13.08    2.535  0.98( 0.10) 0.10      17.1     303.00
     1       41.47   13.24    2.517  0.98( 0.10) 0.10      17.2     300.00
     1       35.57   20.81    2.087  0.98( 0.10) 0.10      18.7     309.00
     2        3.35    5.89    3.818  0.98( 0.10) 0.10       1.0     324.00

  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       38.95    5.89    3.818  0.98( 0.10) 0.10      10.2     324.00
      2       46.30    8.69    3.178  0.98( 0.10) 0.10      14.5     321.00
      3       46.85    9.29    3.041  0.97( 0.10) 0.10      15.3     318.00
      4       46.91    9.75    2.938  0.97( 0.10) 0.10      15.9     315.00
      5       46.68   10.27    2.849  0.98( 0.10) 0.10      16.4     213.00
      6       46.10   10.99    2.769  0.98( 0.10) 0.10      16.9     306.00
      7       43.83   13.08    2.535  0.98( 0.10) 0.10      18.1     303.00
      8       43.65   13.24    2.517  0.98( 0.10) 0.10      18.2     300.00
      9       37.36   20.81    2.087  0.98( 0.10) 0.10      19.7     309.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      46.91    Tc(MIN.) =     9.75
  EFFECTIVE AREA(ACRES) =      15.86   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       19.7
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    326.00 =    2442.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    326.00 TO NODE    329.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1312.97  DOWNSTREAM(FEET) =  1311.92
  FLOW LENGTH(FEET) =   211.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  27.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.65
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      46.91
  PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =   10.21
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    329.00 =    2653.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    329.00 TO NODE    329.00 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.) =   10.21
  RAINFALL INTENSITY(INCH/HR) =   2.86
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =      15.86
  TOTAL STREAM AREA(ACRES) =      19.68
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      46.91

************************************************************************
  FLOW PROCESS FROM NODE    327.00 TO NODE    328.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1329.44  DOWNSTREAM(FEET) =   1328.65

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.051
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.008
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.05
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.35
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.35

************************************************************************
  FLOW PROCESS FROM NODE    328.00 TO NODE    329.00 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1328.65  DOWNSTREAM(FEET) =   1327.48
  CHANNEL LENGTH THRU SUBAREA(FEET) =    76.00   CHANNEL SLOPE =  0.0154
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.804
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.42      0.98     0.100    32
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.05
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.41
  AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   0.90
  Tc(MIN.) =    5.95
  SUBAREA AREA(ACRES) =     0.42       SUBAREA RUNOFF(CFS) =    1.40
  EFFECTIVE AREA(ACRES) =      0.52     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.5         PEAK FLOW RATE(CFS) =       1.73

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.10   FLOW VELOCITY(FEET/SEC.) =   1.68
  LONGEST FLOWPATH FROM NODE    327.00 TO NODE    329.00 =     176.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    329.00 TO NODE    329.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.95
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.804
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.42      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.42      SUBAREA RUNOFF(CFS) =    1.40
  EFFECTIVE AREA(ACRES) =      0.94   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.9       PEAK FLOW RATE(CFS) =       3.14

****************************************************************************
  FLOW PROCESS FROM NODE    329.00 TO NODE    329.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.95
  RAINFALL INTENSITY(INCH/HR) =   3.80
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.94
  TOTAL STREAM AREA(ACRES) =       0.94
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.14
```

```
 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       38.95    6.37    3.708  0.98( 0.10) 0.10      10.2     324.00
     1       46.30    9.15    3.073  0.98( 0.10) 0.10      14.5     321.00
     1       46.85    9.75    2.936  0.97( 0.10) 0.10      15.3     318.00
     1       46.91   10.21    2.857  0.97( 0.10) 0.10      15.9     315.00
     1       46.68   10.74    2.798  0.98( 0.10) 0.10      16.4     213.00
     1       46.10   11.45    2.718  0.98( 0.10) 0.10      16.9     306.00
     1       43.83   13.56    2.481  0.98( 0.10) 0.10      18.1     303.00
     1       43.65   13.72    2.463  0.98( 0.10) 0.10      18.2     300.00
     1       37.36   21.30    2.068  0.98( 0.10) 0.10      19.7     309.00
     2        3.14    5.95    3.804  0.98( 0.10) 0.10       0.9     327.00

 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       40.47    5.95    3.804  0.98( 0.10) 0.10      10.4     327.00
     2       42.00    6.37    3.708  0.98( 0.10) 0.10      11.1     324.00
     3       48.82    9.15    3.073  0.98( 0.10) 0.10      15.5     321.00
     4       49.25    9.75    2.936  0.97( 0.10) 0.10      16.3     318.00
     5       49.25   10.21    2.857  0.97( 0.10) 0.10      16.8     315.00
     6       48.96   10.74    2.798  0.98( 0.10) 0.10      17.3     213.00
     7       48.31   11.45    2.718  0.98( 0.10) 0.10      17.9     306.00
     8       45.84   13.56    2.481  0.98( 0.10) 0.10      19.0     303.00
     9       45.65   13.72    2.463  0.98( 0.10) 0.10      19.1     300.00
    10       39.02   21.30    2.068  0.98( 0.10) 0.10      20.6     309.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      49.25    Tc(MIN.) =     9.75
 EFFECTIVE AREA(ACRES) =      16.29   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =       20.6
 LONGEST FLOWPATH FROM NODE    309.00 TO NODE    329.00 =    2653.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    329.00 TO NODE    336.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1311.92  DOWNSTREAM(FEET) =  1310.58
 FLOW LENGTH(FEET) =   272.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.67
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      49.25
```

```
  PIPE TRAVEL TIME(MIN.) =   0.59    Tc(MIN.) =   10.35
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    336.00 =    2925.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    330.00 TO NODE    331.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1358.55  DOWNSTREAM(FEET) =   1354.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.020
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.35
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.35

****************************************************************************
  FLOW PROCESS FROM NODE    331.00 TO NODE    332.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1354.80  DOWNSTREAM(FEET) =   1335.24
  CHANNEL LENGTH THRU SUBAREA(FEET) =   735.00   CHANNEL SLOPE =  0.0266
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.842
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  COMMERCIAL                  A        1.86      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.73
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.29
  AVERAGE FLOW DEPTH(FEET) =   0.11   TRAVEL TIME(MIN.) =   5.34
  Tc(MIN.) =   10.34
  SUBAREA AREA(ACRES) =     1.86       SUBAREA RUNOFF(CFS) =    4.59
  EFFECTIVE AREA(ACRES) =      1.96     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.97  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        2.0         PEAK FLOW RATE(CFS) =       4.84

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   2.70
  LONGEST FLOWPATH FROM NODE    330.00 TO NODE    332.00 =     835.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    332.00 TO NODE    332.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.34
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.842
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  A        1.86      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.86      SUBAREA RUNOFF(CFS) =    4.59
  EFFECTIVE AREA(ACRES) =      3.82   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        3.8       PEAK FLOW RATE(CFS) =       9.44

****************************************************************************
  FLOW PROCESS FROM NODE    332.00 TO NODE    335.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1331.29  DOWNSTREAM(FEET) =  1314.57
  FLOW LENGTH(FEET) =   525.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  10.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.26
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.44
  PIPE TRAVEL TIME(MIN.) =   0.85    Tc(MIN.) =   11.19
  LONGEST FLOWPATH FROM NODE    330.00 TO NODE    335.00 =    1360.00 FEET.

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

```
  FLOW PROCESS FROM NODE    335.00 TO NODE    335.00 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.) =   11.19
  RAINFALL INTENSITY(INCH/HR) =   2.75
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       3.82
  TOTAL STREAM AREA(ACRES) =       3.82
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.44

****************************************************************************
  FLOW PROCESS FROM NODE    333.00 TO NODE    334.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1344.12  DOWNSTREAM(FEET) =   1340.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.020
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.35
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.35

****************************************************************************
  FLOW PROCESS FROM NODE    334.00 TO NODE    335.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1340.80  DOWNSTREAM(FEET) =   1326.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   773.00   CHANNEL SLOPE =  0.0185
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.759
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  COMMERCIAL                  A        2.46      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.37
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.12
  AVERAGE FLOW DEPTH(FEET) =   0.13   TRAVEL TIME(MIN.) =   6.08
  Tc(MIN.) =   11.08
  SUBAREA AREA(ACRES) =     2.46       SUBAREA RUNOFF(CFS) =    5.89
  EFFECTIVE AREA(ACRES) =      2.56     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.97  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        2.6         PEAK FLOW RATE(CFS) =       6.13

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   2.50
  LONGEST FLOWPATH FROM NODE    333.00 TO NODE    335.00 =     873.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    335.00 TO NODE    335.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.08
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.759
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  A        2.46      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    2.46      SUBAREA RUNOFF(CFS) =    5.89
  EFFECTIVE AREA(ACRES) =      5.02   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        5.0       PEAK FLOW RATE(CFS) =      12.02

****************************************************************************
  FLOW PROCESS FROM NODE    335.00 TO NODE    335.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.08
  RAINFALL INTENSITY(INCH/HR) =   2.76
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       5.02
  TOTAL STREAM AREA(ACRES) =       5.02
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      12.02
```

```
  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        9.44   11.19    2.746  0.98( 0.10) 0.10       3.8     330.00
      2       12.02   11.08    2.759  0.97( 0.10) 0.10       5.0     333.00

  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       21.41   11.08    2.759  0.98( 0.10) 0.10       8.8     333.00
      2       21.40   11.19    2.746  0.97( 0.10) 0.10       8.8     330.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      21.41    Tc(MIN.) =    11.08
  EFFECTIVE AREA(ACRES) =       8.80   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        8.8
  LONGEST FLOWPATH FROM NODE    330.00 TO NODE    335.00 =    1360.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    335.00 TO NODE    336.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1314.57  DOWNSTREAM(FEET) =  1310.58
  FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.67
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.41
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   11.25
  LONGEST FLOWPATH FROM NODE    330.00 TO NODE    336.00 =    1485.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 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       21.41   11.25    2.740  0.98( 0.10) 0.10       8.8     333.00
      2       21.40   11.36    2.728  0.97( 0.10) 0.10       8.8     330.00
  LONGEST FLOWPATH FROM NODE    330.00 TO NODE    336.00 =    1485.00 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       40.47    6.57    3.662  0.98( 0.10) 0.10      10.4     327.00
     2       42.00    6.99    3.566  0.98( 0.10) 0.10      11.1     324.00
     3       48.82    9.74    2.938  0.98( 0.10) 0.10      15.5     321.00
     4       49.25   10.35    2.841  0.97( 0.10) 0.10      16.3     318.00
     5       49.25   10.80    2.791  0.97( 0.10) 0.10      16.8     315.00
     6       48.96   11.33    2.731  0.98( 0.10) 0.10      17.3     213.00
     7       48.31   12.04    2.651  0.98( 0.10) 0.10      17.9     306.00
     8       45.84   14.16    2.414  0.98( 0.10) 0.10      19.0     303.00
     9       45.65   14.32    2.396  0.98( 0.10) 0.10      19.1     300.00
    10       39.02   21.93    2.043  0.98( 0.10) 0.10      20.6     309.00
 LONGEST FLOWPATH FROM NODE    309.00 TO NODE    336.00 =    2925.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       57.33    6.57    3.662  0.98( 0.10) 0.10      15.6     327.00
     2       59.47    6.99    3.566  0.98( 0.10) 0.10      16.6     324.00
     3       68.75    9.74    2.938  0.98( 0.10) 0.10      23.1     321.00
     4       69.69   10.35    2.841  0.98( 0.10) 0.10      24.4     318.00
     5       70.19   10.80    2.791  0.97( 0.10) 0.10      25.3     315.00
     6       70.41   11.25    2.740  0.98( 0.10) 0.10      26.0     333.00
     7       70.37   11.33    2.731  0.98( 0.10) 0.10      26.1     213.00
     8       70.34   11.36    2.728  0.98( 0.10) 0.10      26.2     330.00
     9       69.09   12.04    2.651  0.97( 0.10) 0.10      26.7     306.00
    10       64.70   14.16    2.414  0.98( 0.10) 0.10      27.9     303.00
    11       64.36   14.32    2.396  0.97( 0.10) 0.10      27.9     300.00
    12       54.85   21.93    2.043  0.97( 0.10) 0.10      29.5     309.00
   TOTAL AREA(ACRES) =        29.5

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       70.41  Tc(MIN.) =   11.248
 EFFECTIVE AREA(ACRES) =     26.04  AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =       29.5
 LONGEST FLOWPATH FROM NODE    309.00 TO NODE    336.00 =    2925.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    336.00 TO NODE    340.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1310.58  DOWNSTREAM(FEET) =  1308.10
  FLOW LENGTH(FEET) =   685.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  36.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.32
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      70.41
  PIPE TRAVEL TIME(MIN.) =   1.56    Tc(MIN.) =   12.81
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    340.00 =    3610.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    337.00 TO NODE    338.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1327.94

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.020
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.35
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.35

****************************************************************************
  FLOW PROCESS FROM NODE    338.00 TO NODE    339.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
```

```
 ELEVATION DATA: UPSTREAM(FEET) =   1327.94  DOWNSTREAM(FEET) =   1321.77
 CHANNEL LENGTH THRU SUBAREA(FEET) =   576.00   CHANNEL SLOPE =  0.0107
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.753
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        1.69      0.98     0.100    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.42
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.56
 AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   6.13
 Tc(MIN.) =   11.13
 SUBAREA AREA(ACRES) =     1.69       SUBAREA RUNOFF(CFS) =    4.04
 EFFECTIVE AREA(ACRES) =      1.79     AREA-AVERAGED Fm(INCH/HR) =   0.10
 AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
 TOTAL AREA(ACRES) =        1.8         PEAK FLOW RATE(CFS) =       4.28

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   1.79
 LONGEST FLOWPATH FROM NODE    337.00 TO NODE    339.00 =     676.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    339.00 TO NODE    339.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   11.13
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.753
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        1.69      0.98     0.100    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    1.69      SUBAREA RUNOFF(CFS) =    4.04
 EFFECTIVE AREA(ACRES) =      3.48   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        3.5       PEAK FLOW RATE(CFS) =       8.32

****************************************************************************
 FLOW PROCESS FROM NODE    339.00 TO NODE    340.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1317.75  DOWNSTREAM(FEET) =  1308.10
 FLOW LENGTH(FEET) =   304.00   MANNING'S N =  0.013
```

```
 DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.01
 ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       8.32
 PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =   11.64
 LONGEST FLOWPATH FROM NODE    337.00 TO NODE    340.00 =     980.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 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        8.32   11.64    2.696  0.97( 0.10) 0.10       3.5     337.00
 LONGEST FLOWPATH FROM NODE    337.00 TO NODE    340.00 =     980.00 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       57.33    8.20    3.290  0.98( 0.10) 0.10      15.6     327.00
     2       59.47    8.58    3.204  0.98( 0.10) 0.10      16.6     324.00
     3       68.75   11.30    2.734  0.98( 0.10) 0.10      23.1     321.00
     4       69.69   11.91    2.667  0.98( 0.10) 0.10      24.4     318.00
     5       70.19   12.36    2.616  0.97( 0.10) 0.10      25.3     315.00
     6       70.41   12.81    2.566  0.98( 0.10) 0.10      26.0     333.00
     7       70.37   12.89    2.557  0.98( 0.10) 0.10      26.1     213.00
     8       70.34   12.92    2.553  0.98( 0.10) 0.10      26.2     330.00
     9       69.09   13.60    2.476  0.97( 0.10) 0.10      26.7     306.00
    10       64.70   15.73    2.291  0.98( 0.10) 0.10      27.9     303.00
    11       64.36   15.89    2.284  0.97( 0.10) 0.10      27.9     300.00
    12       54.85   23.57    1.977  0.97( 0.10) 0.10      29.5     309.00
 LONGEST FLOWPATH FROM NODE    309.00 TO NODE    340.00 =    3610.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       64.53    8.20    3.290  0.98( 0.10) 0.10      18.0     327.00
     2       66.79    8.58    3.204  0.98( 0.10) 0.10      19.1     324.00
     3       76.95   11.30    2.734  0.98( 0.10) 0.10      26.5     321.00
     4       77.60   11.64    2.696  0.98( 0.10) 0.10      27.3     337.00
     5       77.91   11.91    2.667  0.98( 0.10) 0.10      27.9     318.00
     6       78.25   12.36    2.616  0.97( 0.10) 0.10      28.7     315.00
     7       78.31   12.81    2.566  0.98( 0.10) 0.10      29.5     333.00
     8       78.24   12.89    2.557  0.98( 0.10) 0.10      29.6     213.00
     9       78.20   12.92    2.553  0.97( 0.10) 0.10      29.7     330.00
    10       76.71   13.60    2.476  0.97( 0.10) 0.10      30.2     306.00
    11       71.71   15.73    2.291  0.97( 0.10) 0.10      31.4     303.00
```

```
     12       71.36   15.89    2.284  0.97( 0.10) 0.10      31.4     300.00
     13       60.87   23.57    1.977  0.98( 0.10) 0.10      32.9     309.00
    TOTAL AREA(ACRES) =        32.9

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       78.31  Tc(MIN.) =   12.807
  EFFECTIVE AREA(ACRES) =     29.52  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       32.9
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    340.00 =    3610.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    343.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1308.10  DOWNSTREAM(FEET) =  1305.41
  FLOW LENGTH(FEET) =   447.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  32.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.30
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      78.31
  PIPE TRAVEL TIME(MIN.) =   0.80    Tc(MIN.) =   13.61
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    343.00 =    4057.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    343.00 TO NODE    343.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    343.00 TO NODE    343.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    341.00 TO NODE    342.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.020
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.35
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.35

****************************************************************************
  FLOW PROCESS FROM NODE    342.00 TO NODE    343.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1305.41
  CHANNEL LENGTH THRU SUBAREA(FEET) =   727.00   CHANNEL SLOPE =  0.0326
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.229
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        7.39      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.00
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.49
  AVERAGE FLOW DEPTH(FEET) =   0.18   TRAVEL TIME(MIN.) =   3.47
  Tc(MIN.) =    8.47
  SUBAREA AREA(ACRES) =     7.39       SUBAREA RUNOFF(CFS) =   20.83
  EFFECTIVE AREA(ACRES) =      7.49     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        7.5         PEAK FLOW RATE(CFS) =      21.11

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.23   FLOW VELOCITY(FEET/SEC.) =   4.17
  LONGEST FLOWPATH FROM NODE    341.00 TO NODE    343.00 =     827.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    343.00 TO NODE    343.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
 MAINLINE Tc(MIN.) =    8.47
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.229
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        7.39      0.98     0.100    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    7.39      SUBAREA RUNOFF(CFS) =   20.83
 EFFECTIVE AREA(ACRES) =     14.88   AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =       14.9       PEAK FLOW RATE(CFS) =      41.94

****************************************************************************
 FLOW PROCESS FROM NODE    343.00 TO NODE    343.00 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       41.94    8.47    3.229  0.98( 0.10) 0.10      14.9     341.00
 LONGEST FLOWPATH FROM NODE    341.00 TO NODE    343.00 =     827.00 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       64.53    9.04    3.098  0.98( 0.10) 0.10      18.0     327.00
     2       66.79    9.41    3.014  0.98( 0.10) 0.10      19.1     324.00
     3       76.95   12.11    2.644  0.98( 0.10) 0.10      26.5     321.00
     4       77.60   12.44    2.606  0.98( 0.10) 0.10      27.3     337.00
     5       77.91   12.71    2.577  0.98( 0.10) 0.10      27.9     318.00
     6       78.25   13.16    2.526  0.97( 0.10) 0.10      28.7     315.00
     7       78.31   13.61    2.476  0.98( 0.10) 0.10      29.5     333.00
     8       78.24   13.69    2.467  0.98( 0.10) 0.10      29.6     213.00
     9       78.20   13.72    2.464  0.97( 0.10) 0.10      29.7     330.00
    10       76.71   14.41    2.386  0.97( 0.10) 0.10      30.2     306.00
    11       71.71   16.56    2.258  0.97( 0.10) 0.10      31.4     303.00
    12       71.36   16.72    2.251  0.97( 0.10) 0.10      31.4     300.00
    13       60.87   24.43    1.943  0.98( 0.10) 0.10      32.9     309.00
 LONGEST FLOWPATH FROM NODE    309.00 TO NODE    343.00 =    4057.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      105.01    8.47    3.229  0.98( 0.10) 0.10      31.8     341.00
     2      104.72    9.04    3.098  0.98( 0.10) 0.10      32.9     327.00
     3      105.85    9.41    3.014  0.98( 0.10) 0.10      34.0     324.00
     4      111.05   12.11    2.644  0.98( 0.10) 0.10      41.4     321.00
```

```
     5      111.20   12.44    2.606  0.97( 0.10) 0.10      42.2     337.00
     6      111.12   12.71    2.577  0.98( 0.10) 0.10      42.7     318.00
     7      110.78   13.16    2.526  0.97( 0.10) 0.10      43.6     315.00
     8      110.16   13.61    2.476  0.98( 0.10) 0.10      44.4     333.00
     9      109.97   13.69    2.467  0.98( 0.10) 0.10      44.5     213.00
    10      109.88   13.72    2.464  0.98( 0.10) 0.10      44.5     330.00
    11      107.36   14.41    2.386  0.97( 0.10) 0.10      45.1     306.00
    12      100.65   16.56    2.258  0.98( 0.10) 0.10      46.2     303.00
    13      100.20   16.72    2.251  0.98( 0.10) 0.10      46.3     300.00
    14       85.58   24.43    1.943  0.98( 0.10) 0.10      47.8     309.00
   TOTAL AREA(ACRES) =        47.8

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      111.20  Tc(MIN.) =   12.442
  EFFECTIVE AREA(ACRES) =     42.18  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       47.8
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    343.00 =    4057.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    343.00 TO NODE    343.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    401.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1331.99  DOWNSTREAM(FEET) =   1330.99

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.020
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.35
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.35

****************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    402.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
```

```
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1330.99  DOWNSTREAM(FEET) =   1325.67
  CHANNEL LENGTH THRU SUBAREA(FEET) =   612.00   CHANNEL SLOPE =  0.0087
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.718
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        2.28      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.08
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.58
  AVERAGE FLOW DEPTH(FEET) =   0.14   TRAVEL TIME(MIN.) =   6.45
  Tc(MIN.) =   11.45
  SUBAREA AREA(ACRES) =     2.28       SUBAREA RUNOFF(CFS) =    5.38
  EFFECTIVE AREA(ACRES) =      2.38     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.97  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        2.4         PEAK FLOW RATE(CFS) =       5.61

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.18   FLOW VELOCITY(FEET/SEC.) =   1.78
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    402.00 =     712.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    402.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.45
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.718
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        2.28      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    2.28      SUBAREA RUNOFF(CFS) =    5.38
  EFFECTIVE AREA(ACRES) =      4.66   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        4.7       PEAK FLOW RATE(CFS) =      10.99

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    406.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =  1322.57  DOWNSTREAM(FEET) =  1310.63
  FLOW LENGTH(FEET) =    22.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   5.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  31.34
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.99
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   11.46
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    406.00 =     734.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    406.00 TO NODE    406.00 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.) =   11.46
  RAINFALL INTENSITY(INCH/HR) =   2.72
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       4.66
  TOTAL STREAM AREA(ACRES) =       4.66
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      10.99

****************************************************************************
  FLOW PROCESS FROM NODE    403.00 TO NODE    404.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1333.09  DOWNSTREAM(FEET) =   1327.13

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.020
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.35
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.35

****************************************************************************
  FLOW PROCESS FROM NODE    404.00 TO NODE    405.00 IS CODE =  51
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1327.13  DOWNSTREAM(FEET) =   1314.38
  CHANNEL LENGTH THRU SUBAREA(FEET) =   506.00   CHANNEL SLOPE =  0.0252
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.885
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.43      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.90
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.69
  AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   4.98
  Tc(MIN.) =    9.98
  SUBAREA AREA(ACRES) =     0.43       SUBAREA RUNOFF(CFS) =    1.08
  EFFECTIVE AREA(ACRES) =      0.53     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.5         PEAK FLOW RATE(CFS) =       1.33

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   1.78
  LONGEST FLOWPATH FROM NODE    403.00 TO NODE    405.00 =     606.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    405.00 TO NODE    405.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.98
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  2.885
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.43      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.43      SUBAREA RUNOFF(CFS) =    1.08
  EFFECTIVE AREA(ACRES) =      0.96   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.0       PEAK FLOW RATE(CFS) =       2.41

****************************************************************************
  FLOW PROCESS FROM NODE    405.00 TO NODE    406.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1310.90  DOWNSTREAM(FEET) =  1310.63
  FLOW LENGTH(FEET) =    54.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   9.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.57
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.41
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   10.23
  LONGEST FLOWPATH FROM NODE    403.00 TO NODE    406.00 =     660.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    406.00 TO NODE    406.00 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.) =   10.23
  RAINFALL INTENSITY(INCH/HR) =   2.85
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.96
  TOTAL STREAM AREA(ACRES) =       0.96
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.41

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       10.99   11.46    2.716  0.97( 0.10) 0.10       4.7     400.00
      2        2.41   10.23    2.854  0.98( 0.10) 0.10       1.0     403.00

  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       12.73   10.23    2.854  0.97( 0.10) 0.10       5.1     403.00
      2       13.28   11.46    2.716  0.97( 0.10) 0.10       5.6     400.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      13.28    Tc(MIN.) =    11.46
  EFFECTIVE AREA(ACRES) =       5.62   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        5.6
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    406.00 =     734.00 FEET.

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

```
  FLOW PROCESS FROM NODE    406.00 TO NODE    410.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1310.63  DOWNSTREAM(FEET) =  1309.86
  FLOW LENGTH(FEET) =   154.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.57
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.28
  PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =   11.92
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    410.00 =     888.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 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.) =   11.92
  RAINFALL INTENSITY(INCH/HR) =   2.66
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       5.62
  TOTAL STREAM AREA(ACRES) =       5.62
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      13.28

****************************************************************************
  FLOW PROCESS FROM NODE    407.00 TO NODE    408.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1333.09  DOWNSTREAM(FEET) =   1329.82

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.020
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.35
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.35
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    408.00 TO NODE    409.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.82  DOWNSTREAM(FEET) =   1325.77
  CHANNEL LENGTH THRU SUBAREA(FEET) =    84.00   CHANNEL SLOPE =  0.0482
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.845
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.13      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.57
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.83
  AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   0.77
  Tc(MIN.) =    5.77
  SUBAREA AREA(ACRES) =     0.13       SUBAREA RUNOFF(CFS) =    0.44
  EFFECTIVE AREA(ACRES) =      0.23     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.2         PEAK FLOW RATE(CFS) =       0.78

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   2.32
  LONGEST FLOWPATH FROM NODE    407.00 TO NODE    409.00 =     184.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    409.00 TO NODE    409.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.77
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.845
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.13      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.13      SUBAREA RUNOFF(CFS) =    0.44
  EFFECTIVE AREA(ACRES) =      0.36   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.4       PEAK FLOW RATE(CFS) =       1.21

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

```
  FLOW PROCESS FROM NODE    409.00 TO NODE    410.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1322.82  DOWNSTREAM(FEET) =  1309.86
  FLOW LENGTH(FEET) =    22.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   1.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.17
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.21
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    5.79
  LONGEST FLOWPATH FROM NODE    407.00 TO NODE    410.00 =     206.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.79
  RAINFALL INTENSITY(INCH/HR) =   3.84
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.36
  TOTAL STREAM AREA(ACRES) =       0.36
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.21

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       12.73   10.69    2.802  0.97( 0.10) 0.10       5.1     403.00
      1       13.28   11.92    2.665  0.97( 0.10) 0.10       5.6     400.00
      2        1.21    5.79    3.840  0.98( 0.10) 0.10       0.4     407.00

  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       10.75    5.79    3.840  0.97( 0.10) 0.10       3.1     407.00
      2       13.61   10.69    2.802  0.97( 0.10) 0.10       5.5     403.00
      3       14.11   11.92    2.665  0.97( 0.10) 0.10       6.0     400.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
```

```
  PEAK FLOW RATE(CFS) =      14.11    Tc(MIN.) =    11.92
  EFFECTIVE AREA(ACRES) =       5.98   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        6.0
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    410.00 =     888.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    424.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1309.86  DOWNSTREAM(FEET) =  1309.34
  FLOW LENGTH(FEET) =   103.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.64
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.11
  PIPE TRAVEL TIME(MIN.) =   0.30    Tc(MIN.) =   12.23
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    424.00 =     991.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    424.00 TO NODE    424.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    424.00 TO NODE    424.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    411.00 TO NODE    412.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.020
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.35
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.35

****************************************************************************
  FLOW PROCESS FROM NODE    412.00 TO NODE    413.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1328.53
  CHANNEL LENGTH THRU SUBAREA(FEET) =   202.00   CHANNEL SLOPE =  0.0028
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.161
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.99      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.74
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.89
  AVERAGE FLOW DEPTH(FEET) =   0.14   TRAVEL TIME(MIN.) =   3.77
  Tc(MIN.) =    8.77
  SUBAREA AREA(ACRES) =     0.99       SUBAREA RUNOFF(CFS) =    2.73
  EFFECTIVE AREA(ACRES) =      1.09     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =       3.01

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.17   FLOW VELOCITY(FEET/SEC.) =   1.02
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    413.00 =     302.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    413.00 TO NODE    413.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.77
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.161
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.99      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.99      SUBAREA RUNOFF(CFS) =    2.73
  EFFECTIVE AREA(ACRES) =      2.08   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
```

```
  TOTAL AREA(ACRES) =        2.1       PEAK FLOW RATE(CFS) =       5.74

****************************************************************************
  FLOW PROCESS FROM NODE    413.00 TO NODE    416.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1323.25  DOWNSTREAM(FEET) =  1321.34
  FLOW LENGTH(FEET) =   208.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  11.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.59
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.74
  PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =    9.39
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    416.00 =     510.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    416.00 TO NODE    416.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.39
  RAINFALL INTENSITY(INCH/HR) =   3.02
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       2.08
  TOTAL STREAM AREA(ACRES) =       2.08
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.74

****************************************************************************
  FLOW PROCESS FROM NODE    414.00 TO NODE    415.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.020
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.35
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.35

****************************************************************************
  FLOW PROCESS FROM NODE    415.00 TO NODE    416.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1328.53
  CHANNEL LENGTH THRU SUBAREA(FEET) =   203.00   CHANNEL SLOPE =  0.0028
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.156
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.99      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.74
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.89
  AVERAGE FLOW DEPTH(FEET) =   0.14   TRAVEL TIME(MIN.) =   3.79
  Tc(MIN.) =    8.79
  SUBAREA AREA(ACRES) =     0.99       SUBAREA RUNOFF(CFS) =    2.73
  EFFECTIVE AREA(ACRES) =      1.09     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =       3.00

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.17   FLOW VELOCITY(FEET/SEC.) =   1.02
  LONGEST FLOWPATH FROM NODE    414.00 TO NODE    416.00 =     303.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    416.00 TO NODE    416.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.79
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.156
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.99      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.99      SUBAREA RUNOFF(CFS) =    2.73
  EFFECTIVE AREA(ACRES) =      2.08   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
```

```
  TOTAL AREA(ACRES) =        2.1       PEAK FLOW RATE(CFS) =       5.73

****************************************************************************
  FLOW PROCESS FROM NODE    416.00 TO NODE    416.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.79
  RAINFALL INTENSITY(INCH/HR) =   3.16
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       2.08
  TOTAL STREAM AREA(ACRES) =       2.08
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.73

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        5.74    9.39    3.020  0.98( 0.10) 0.10       2.1     411.00
      2        5.73    8.79    3.156  0.98( 0.10) 0.10       2.1     414.00

  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       11.35    8.79    3.156  0.98( 0.10) 0.10       4.0     414.00
      2       11.21    9.39    3.020  0.98( 0.10) 0.10       4.2     411.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      11.35    Tc(MIN.) =     8.79
  EFFECTIVE AREA(ACRES) =       4.03   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        4.2
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    416.00 =     510.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    416.00 TO NODE    419.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1321.34  DOWNSTREAM(FEET) =  1319.26
  FLOW LENGTH(FEET) =   209.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.4 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.00
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.35
  PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =    9.29
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    419.00 =     719.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    419.00 TO NODE    419.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.29
  RAINFALL INTENSITY(INCH/HR) =   3.04
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       4.03
  TOTAL STREAM AREA(ACRES) =       4.16
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      11.35

****************************************************************************
  FLOW PROCESS FROM NODE    417.00 TO NODE    418.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.020
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.35
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.35

****************************************************************************
  FLOW PROCESS FROM NODE    418.00 TO NODE    419.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1328.53
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =   193.00   CHANNEL SLOPE =  0.0029
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.179
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.83      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.52
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.87
  AVERAGE FLOW DEPTH(FEET) =   0.13   TRAVEL TIME(MIN.) =   3.69
  Tc(MIN.) =    8.69
  SUBAREA AREA(ACRES) =     0.83       SUBAREA RUNOFF(CFS) =    2.30
  EFFECTIVE AREA(ACRES) =      0.93     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.9          PEAK FLOW RATE(CFS) =       2.58

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   0.98
  LONGEST FLOWPATH FROM NODE    417.00 TO NODE    419.00 =     293.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    419.00 TO NODE    419.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.69
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.179
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.83      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.83      SUBAREA RUNOFF(CFS) =    2.30
  EFFECTIVE AREA(ACRES) =      1.76   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.8       PEAK FLOW RATE(CFS) =       4.88

****************************************************************************
  FLOW PROCESS FROM NODE    419.00 TO NODE    419.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.69
```

```
  RAINFALL INTENSITY(INCH/HR) =   3.18
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.76
  TOTAL STREAM AREA(ACRES) =       1.76
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.88

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       11.35    9.29    3.043  0.98( 0.10) 0.10       4.0     414.00
      1       11.21    9.88    2.906  0.98( 0.10) 0.10       4.2     411.00
      2        4.88    8.69    3.179  0.98( 0.10) 0.10       1.8     417.00

  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       15.99    8.69    3.179  0.98( 0.10) 0.10       5.5     417.00
      2       16.01    9.29    3.043  0.98( 0.10) 0.10       5.8     414.00
      3       15.66    9.88    2.906  0.98( 0.10) 0.10       5.9     411.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      16.01    Tc(MIN.) =     9.29
  EFFECTIVE AREA(ACRES) =       5.79   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        5.9
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    419.00 =     719.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    419.00 TO NODE    423.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1319.26  DOWNSTREAM(FEET) =  1310.69
  FLOW LENGTH(FEET) =   607.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.60
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.01
  PIPE TRAVEL TIME(MIN.) =   1.18    Tc(MIN.) =   10.46
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    423.00 =    1326.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    423.00 TO NODE    423.00 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.) =   10.46
  RAINFALL INTENSITY(INCH/HR) =   2.83
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       5.79
  TOTAL STREAM AREA(ACRES) =       5.92
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      16.01

****************************************************************************
  FLOW PROCESS FROM NODE    420.00 TO NODE    421.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1333.33  DOWNSTREAM(FEET) =   1330.07

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.020
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.35
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.35

****************************************************************************
  FLOW PROCESS FROM NODE    421.00 TO NODE    422.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1330.07  DOWNSTREAM(FEET) =   1326.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   168.00   CHANNEL SLOPE =  0.0189
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.596
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.26      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.76
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.51
  AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   1.86
  Tc(MIN.) =    6.86
  SUBAREA AREA(ACRES) =     0.26       SUBAREA RUNOFF(CFS) =    0.82
  EFFECTIVE AREA(ACRES) =      0.36     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.4          PEAK FLOW RATE(CFS) =       1.13

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.08   FLOW VELOCITY(FEET/SEC.) =   1.74
  LONGEST FLOWPATH FROM NODE    420.00 TO NODE    422.00 =     268.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    422.00 TO NODE    422.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.86
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.596
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.26      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.26      SUBAREA RUNOFF(CFS) =    0.82
  EFFECTIVE AREA(ACRES) =      0.62   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.6       PEAK FLOW RATE(CFS) =       1.95

****************************************************************************
  FLOW PROCESS FROM NODE    422.00 TO NODE    423.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1324.00  DOWNSTREAM(FEET) =  1310.69
  FLOW LENGTH(FEET) =    22.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   2.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.00
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.95
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    6.88
  LONGEST FLOWPATH FROM NODE    420.00 TO NODE    423.00 =     290.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    423.00 TO NODE    423.00 IS CODE =   1
```

```
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.88
  RAINFALL INTENSITY(INCH/HR) =   3.59
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.62
  TOTAL STREAM AREA(ACRES) =       0.62
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.95

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       15.99    9.87    2.911  0.98( 0.10) 0.10       5.5     417.00
      1       16.01   10.46    2.828  0.98( 0.10) 0.10       5.8     414.00
      1       15.66   11.07    2.761  0.98( 0.10) 0.10       5.9     411.00
      2        1.95    6.88    3.592  0.98( 0.10) 0.10       0.6     420.00

  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       15.80    6.88    3.592  0.98( 0.10) 0.10       4.5     420.00
      2       17.56    9.87    2.911  0.98( 0.10) 0.10       6.1     417.00
      3       17.54   10.46    2.828  0.98( 0.10) 0.10       6.4     414.00
      4       17.14   11.07    2.761  0.98( 0.10) 0.10       6.5     411.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      17.56    Tc(MIN.) =     9.87
  EFFECTIVE AREA(ACRES) =       6.15   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        6.5
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    423.00 =    1326.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    423.00 TO NODE    424.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1310.69  DOWNSTREAM(FEET) =  1309.34
  FLOW LENGTH(FEET) =    38.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.5 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.37
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.56
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    9.92
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    424.00 =    1364.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    424.00 TO NODE    424.00 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       15.80    6.93    3.580  0.98( 0.10) 0.10       4.5     420.00
      2       17.56    9.92    2.899  0.98( 0.10) 0.10       6.1     417.00
      3       17.54   10.51    2.822  0.98( 0.10) 0.10       6.4     414.00
      4       17.14   11.12    2.755  0.98( 0.10) 0.10       6.5     411.00
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    424.00 =    1364.00 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       10.75    6.12    3.765  0.97( 0.10) 0.10       3.1     407.00
      2       13.61   11.00    2.768  0.97( 0.10) 0.10       5.5     403.00
      3       14.11   12.23    2.631  0.97( 0.10) 0.10       6.0     400.00
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    424.00 =     991.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       25.44    6.12    3.765  0.98( 0.10) 0.10       7.1     407.00
      2       27.02    6.93    3.580  0.98( 0.10) 0.10       8.0     420.00
      3       30.54    9.92    2.899  0.98( 0.10) 0.10      11.1     417.00
      4       30.86   10.51    2.822  0.98( 0.10) 0.10      11.7     414.00
      5       30.83   11.00    2.768  0.98( 0.10) 0.10      12.0     403.00
      6       30.80   11.12    2.755  0.98( 0.10) 0.10      12.1     411.00
      7       30.45   12.23    2.631  0.98( 0.10) 0.10      12.5     400.00
    TOTAL AREA(ACRES) =        12.5

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       30.86  Tc(MIN.) =   10.514
  EFFECTIVE AREA(ACRES) =     11.65  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       12.5
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    424.00 =    1364.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    424.00 TO NODE    424.00 IS CODE =  12
```

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

****************************************************************************
  FLOW PROCESS FROM NODE    424.00 TO NODE    431.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1309.34  DOWNSTREAM(FEET) =  1302.92
  FLOW LENGTH(FEET) =   310.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.51
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      30.86
  PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =   10.96
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    431.00 =    1674.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    431.00 TO NODE    431.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    431.00 TO NODE    431.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    425.00 TO NODE    426.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.13

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.020
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.35
```

```
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.35

****************************************************************************
  FLOW PROCESS FROM NODE    426.00 TO NODE    427.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.13  DOWNSTREAM(FEET) =   1312.52
  CHANNEL LENGTH THRU SUBAREA(FEET) =   402.00   CHANNEL SLOPE =  0.0413
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.363
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.73      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.44
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.33
  AVERAGE FLOW DEPTH(FEET) =   0.08   TRAVEL TIME(MIN.) =   2.88
  Tc(MIN.) =    7.88
  SUBAREA AREA(ACRES) =     0.73       SUBAREA RUNOFF(CFS) =    2.15
  EFFECTIVE AREA(ACRES) =      0.83     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.97  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.8         PEAK FLOW RATE(CFS) =       2.44

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.10   FLOW VELOCITY(FEET/SEC.) =   2.66
  LONGEST FLOWPATH FROM NODE    425.00 TO NODE    427.00 =     502.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    427.00 TO NODE    427.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.88
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.363
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.73      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.73      SUBAREA RUNOFF(CFS) =    2.15
  EFFECTIVE AREA(ACRES) =      1.56   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.6       PEAK FLOW RATE(CFS) =       4.59
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    427.00 TO NODE    430.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1309.00  DOWNSTREAM(FEET) =  1305.31
  FLOW LENGTH(FEET) =   191.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   9.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.99
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.59
  PIPE TRAVEL TIME(MIN.) =   0.46    Tc(MIN.) =    8.34
  LONGEST FLOWPATH FROM NODE    425.00 TO NODE    430.00 =     693.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    430.00 TO NODE    430.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.34
  RAINFALL INTENSITY(INCH/HR) =   3.26
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.56
  TOTAL STREAM AREA(ACRES) =       1.56
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.59

****************************************************************************
  FLOW PROCESS FROM NODE    428.00 TO NODE    429.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1322.64  DOWNSTREAM(FEET) =   1318.64

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.020
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.35
```

```
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.35

****************************************************************************
  FLOW PROCESS FROM NODE    429.00 TO NODE    430.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1318.64  DOWNSTREAM(FEET) =   1314.94
  CHANNEL LENGTH THRU SUBAREA(FEET) =   138.00   CHANNEL SLOPE =  0.0268
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.667
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.09      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.50
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.49
  AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   1.55
  Tc(MIN.) =    6.55
  SUBAREA AREA(ACRES) =     0.09       SUBAREA RUNOFF(CFS) =    0.29
  EFFECTIVE AREA(ACRES) =      0.19     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.97  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.2         PEAK FLOW RATE(CFS) =       0.61

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   1.51
  LONGEST FLOWPATH FROM NODE    428.00 TO NODE    430.00 =     238.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    430.00 TO NODE    430.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.55
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.667
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.09      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.09      SUBAREA RUNOFF(CFS) =    0.29
  EFFECTIVE AREA(ACRES) =      0.28   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.3       PEAK FLOW RATE(CFS) =       0.90
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    430.00 TO NODE    430.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.55
  RAINFALL INTENSITY(INCH/HR) =   3.67
  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.28
  TOTAL STREAM AREA(ACRES) =       0.28
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.90

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        4.59    8.34    3.259  0.97( 0.10) 0.10       1.6     425.00
      2        0.90    6.55    3.667  0.97( 0.10) 0.10       0.3     428.00

  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        4.97    6.55    3.667  0.97( 0.10) 0.10       1.5     428.00
      2        5.38    8.34    3.259  0.97( 0.10) 0.10       1.8     425.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.38    Tc(MIN.) =     8.34
  EFFECTIVE AREA(ACRES) =       1.84   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.97  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.8
  LONGEST FLOWPATH FROM NODE    425.00 TO NODE    430.00 =     693.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    430.00 TO NODE    431.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1305.31  DOWNSTREAM(FEET) =  1302.92
  FLOW LENGTH(FEET) =   124.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   8.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.49
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
```

```
 PIPE-FLOW(CFS) =       5.38
 PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =    8.61
 LONGEST FLOWPATH FROM NODE    425.00 TO NODE    431.00 =     817.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    431.00 TO NODE    431.00 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        4.97    6.83    3.603  0.97( 0.10) 0.10       1.5     428.00
     2        5.38    8.61    3.197  0.97( 0.10) 0.10       1.8     425.00
 LONGEST FLOWPATH FROM NODE    425.00 TO NODE    431.00 =     817.00 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       25.44    6.58    3.660  0.98( 0.10) 0.10       7.1     407.00
     2       27.02    7.38    3.476  0.98( 0.10) 0.10       8.0     420.00
     3       30.54   10.37    2.839  0.98( 0.10) 0.10      11.1     417.00
     4       30.86   10.96    2.772  0.98( 0.10) 0.10      11.7     414.00
     5       30.83   11.45    2.718  0.98( 0.10) 0.10      12.0     403.00
     6       30.80   11.57    2.705  0.98( 0.10) 0.10      12.1     411.00
     7       30.45   12.67    2.580  0.98( 0.10) 0.10      12.5     400.00
 LONGEST FLOWPATH FROM NODE    411.00 TO NODE    431.00 =    1674.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       30.30    6.58    3.660  0.98( 0.10) 0.10       8.5     407.00
     2       30.90    6.83    3.603  0.98( 0.10) 0.10       8.9     428.00
     3       32.12    7.38    3.476  0.98( 0.10) 0.10       9.6     420.00
     4       33.85    8.61    3.197  0.98( 0.10) 0.10      11.1     425.00
     5       35.30   10.37    2.839  0.98( 0.10) 0.10      12.9     417.00
     6       35.51   10.96    2.772  0.98( 0.10) 0.10      13.5     414.00
     7       35.38   11.45    2.718  0.98( 0.10) 0.10      13.8     403.00
     8       35.33   11.57    2.705  0.98( 0.10) 0.10      13.9     411.00
     9       34.76   12.67    2.580  0.98( 0.10) 0.10      14.4     400.00
   TOTAL AREA(ACRES) =        14.4

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       35.51  Tc(MIN.) =   10.963
 EFFECTIVE AREA(ACRES) =     13.49  AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =       14.4
 LONGEST FLOWPATH FROM NODE    411.00 TO NODE    431.00 =    1674.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    431.00 TO NODE    431.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    431.00 TO NODE    437.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1302.92  DOWNSTREAM(FEET) =  1294.50
  FLOW LENGTH(FEET) =   379.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.54
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      35.51
  PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =   11.47
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    437.00 =    2053.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    437.00 TO NODE    437.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    437.00 TO NODE    437.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    432.00 TO NODE    433.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1334.00  DOWNSTREAM(FEET) =   1333.15

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.020
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.35
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.35

****************************************************************************
  FLOW PROCESS FROM NODE    433.00 TO NODE    434.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1333.15  DOWNSTREAM(FEET) =   1299.66
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2503.00   CHANNEL SLOPE =  0.0134
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  1.785
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        2.63      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.51
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.78
  AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =  23.37
  Tc(MIN.) =   28.37
  SUBAREA AREA(ACRES) =     2.63       SUBAREA RUNOFF(CFS) =    3.99
  EFFECTIVE AREA(ACRES) =      2.73     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        2.7         PEAK FLOW RATE(CFS) =       4.15

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.15   FLOW VELOCITY(FEET/SEC.) =   1.92
  LONGEST FLOWPATH FROM NODE    432.00 TO NODE    434.00 =    2603.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    434.00 TO NODE    434.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   28.37
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  1.785
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        2.63      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    2.63      SUBAREA RUNOFF(CFS) =    3.99
  EFFECTIVE AREA(ACRES) =      5.36   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
```

```
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =       8.14

****************************************************************************
  FLOW PROCESS FROM NODE    434.00 TO NODE    437.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1295.87  DOWNSTREAM(FEET) =  1294.50
  FLOW LENGTH(FEET) =   275.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.97
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.14
  PIPE TRAVEL TIME(MIN.) =   0.92    Tc(MIN.) =   29.30
  LONGEST FLOWPATH FROM NODE    432.00 TO NODE    437.00 =    2878.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    437.00 TO NODE    437.00 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        8.14   29.30    1.748  0.98( 0.10) 0.10       5.4     432.00
  LONGEST FLOWPATH FROM NODE    432.00 TO NODE    437.00 =    2878.00 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       30.30    7.11    3.539  0.98( 0.10) 0.10       8.5     407.00
      2       30.90    7.36    3.482  0.98( 0.10) 0.10       8.9     428.00
      3       32.12    7.91    3.355  0.98( 0.10) 0.10       9.6     420.00
      4       33.85    9.12    3.081  0.98( 0.10) 0.10      11.1     425.00
      5       35.30   10.87    2.783  0.98( 0.10) 0.10      12.9     417.00
      6       35.51   11.47    2.716  0.98( 0.10) 0.10      13.5     414.00
      7       35.38   11.95    2.661  0.98( 0.10) 0.10      13.8     403.00
      8       35.33   12.07    2.648  0.98( 0.10) 0.10      13.9     411.00
      9       34.76   13.18    2.524  0.98( 0.10) 0.10      14.4     400.00
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    437.00 =    2053.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       34.42    7.11    3.539  0.98( 0.10) 0.10       9.8     407.00
      2       35.09    7.36    3.482  0.98( 0.10) 0.10      10.2     428.00
      3       36.46    7.91    3.355  0.98( 0.10) 0.10      11.1     420.00
      4       38.43    9.12    3.081  0.98( 0.10) 0.10      12.8     425.00
```

```
      5       40.21   10.87    2.783  0.98( 0.10) 0.10      14.9     417.00
      6       40.56   11.47    2.716  0.98( 0.10) 0.10      15.6     414.00
      7       40.54   11.95    2.661  0.98( 0.10) 0.10      16.0     403.00
      8       40.51   12.07    2.648  0.98( 0.10) 0.10      16.1     411.00
      9       40.15   13.18    2.524  0.98( 0.10) 0.10      16.8     400.00
     10       31.79   29.30    1.748  0.98( 0.10) 0.10      19.7     432.00
    TOTAL AREA(ACRES) =        19.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       40.56  Tc(MIN.) =   11.467
  EFFECTIVE AREA(ACRES) =     15.59  AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       19.7
  LONGEST FLOWPATH FROM NODE    432.00 TO NODE    437.00 =    2878.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    437.00 TO NODE    437.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    437.00 TO NODE    437.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    437.00 TO NODE    437.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    435.00 TO NODE    436.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1328.83  DOWNSTREAM(FEET) =   1322.08

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.020
  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.)
  COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
```

```
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.35
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.35

****************************************************************************
  FLOW PROCESS FROM NODE    436.00 TO NODE    437.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1322.08  DOWNSTREAM(FEET) =   1294.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   568.00   CHANNEL SLOPE =  0.0486
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.321
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        2.59      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.21
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.09
  AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   3.07
  Tc(MIN.) =    8.07
  SUBAREA AREA(ACRES) =     2.59       SUBAREA RUNOFF(CFS) =    7.51
  EFFECTIVE AREA(ACRES) =      2.69     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        2.7         PEAK FLOW RATE(CFS) =       7.80

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.14   FLOW VELOCITY(FEET/SEC.) =   3.90
  LONGEST FLOWPATH FROM NODE    435.00 TO NODE    437.00 =     668.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    437.00 TO NODE    437.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.07
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  3.321
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        2.59      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    2.59      SUBAREA RUNOFF(CFS) =    7.51
  EFFECTIVE AREA(ACRES) =      5.28   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
```

```
 TOTAL AREA(ACRES) =        5.3       PEAK FLOW RATE(CFS) =      15.32

****************************************************************************
 FLOW PROCESS FROM NODE    437.00 TO NODE    437.00 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       15.32    8.07    3.321  0.98( 0.10) 0.10       5.3     435.00
 LONGEST FLOWPATH FROM NODE    435.00 TO NODE    437.00 =     668.00 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       34.42    7.11    3.539  0.98( 0.10) 0.10       9.8     407.00
     2       35.09    7.36    3.482  0.98( 0.10) 0.10      10.2     428.00
     3       36.46    7.91    3.355  0.98( 0.10) 0.10      11.1     420.00
     4       38.43    9.12    3.081  0.98( 0.10) 0.10      12.8     425.00
     5       40.21   10.87    2.783  0.98( 0.10) 0.10      14.9     417.00
     6       40.56   11.47    2.716  0.98( 0.10) 0.10      15.6     414.00
     7       40.54   11.95    2.661  0.98( 0.10) 0.10      16.0     403.00
     8       40.51   12.07    2.648  0.98( 0.10) 0.10      16.1     411.00
     9       40.15   13.18    2.524  0.98( 0.10) 0.10      16.8     400.00
    10       31.79   29.30    1.748  0.98( 0.10) 0.10      19.7     432.00
 LONGEST FLOWPATH FROM NODE    432.00 TO NODE    437.00 =    2878.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       48.84    7.11    3.539  0.98( 0.10) 0.10      14.5     407.00
     2       49.77    7.36    3.482  0.97( 0.10) 0.10      15.0     428.00
     3       51.65    7.91    3.355  0.98( 0.10) 0.10      16.2     420.00
     4       52.03    8.07    3.321  0.98( 0.10) 0.10      16.6     435.00
     5       52.61    9.12    3.081  0.98( 0.10) 0.10      18.1     425.00
     6       52.97   10.87    2.783  0.98( 0.10) 0.10      20.2     417.00
     7       53.01   11.47    2.716  0.98( 0.10) 0.10      20.9     414.00
     8       52.72   11.95    2.661  0.98( 0.10) 0.10      21.3     403.00
     9       52.63   12.07    2.648  0.98( 0.10) 0.10      21.4     411.00
    10       51.68   13.18    2.524  0.98( 0.10) 0.10      22.1     400.00
    11       39.64   29.30    1.748  0.98( 0.10) 0.10      25.0     432.00
   TOTAL AREA(ACRES) =        25.0

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       53.01  Tc(MIN.) =   11.467
 EFFECTIVE AREA(ACRES) =     20.87  AREA-AVERAGED Fm(INCH/HR) =  0.10
 AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =       25.0
```

```
 LONGEST FLOWPATH FROM NODE    432.00 TO NODE    437.00 =    2878.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    437.00 TO NODE    437.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    500.00 TO NODE    501.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 ELEVATION DATA: UPSTREAM(FEET) =   1335.00  DOWNSTREAM(FEET) =   1333.18

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  4.020
 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.)
 COMMERCIAL                 A        0.10      0.98     0.100    32    5.00
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.97
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      0.35
 TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.35

****************************************************************************
 FLOW PROCESS FROM NODE    501.00 TO NODE    502.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1333.18  DOWNSTREAM(FEET) =   1298.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  2797.00   CHANNEL SLOPE =  0.0126
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
 *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  1.558
 SUBAREA LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        0.67      0.98     0.100    32
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.81
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.31
 AVERAGE FLOW DEPTH(FEET) =   0.08   TRAVEL TIME(MIN.) =  35.56
 Tc(MIN.) =   40.56
```

```
  SUBAREA AREA(ACRES) =     0.67       SUBAREA RUNOFF(CFS) =    0.88
  EFFECTIVE AREA(ACRES) =      0.77     AREA-AVERAGED Fm(INCH/HR) =   0.10
  AREA-AVERAGED Fp(INCH/HR) =   0.98  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.8         PEAK FLOW RATE(CFS) =       1.01

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   1.36
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    502.00 =    2897.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    502.00 TO NODE    502.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   40.56
  *  25 YEAR RAINFALL INTENSITY(INCH/HR) =  1.558
  SUBAREA LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.67      0.98     0.100    32
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.98
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.67      SUBAREA RUNOFF(CFS) =    0.88
  EFFECTIVE AREA(ACRES) =      1.44   AREA-AVERAGED Fm(INCH/HR) =  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.4       PEAK FLOW RATE(CFS) =       1.89
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.4  TC(MIN.) =     40.56
  EFFECTIVE AREA(ACRES) =      1.44  AREA-AVERAGED Fm(INCH/HR)=  0.10
  AREA-AVERAGED Fp(INCH/HR) =  0.98  AREA-AVERAGED Ap = 0.100
  PEAK FLOW RATE(CFS)   =       1.89
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
         (Reference: 1986 SAN BERNARDINO CO. HYDROLOGY CRITERION)
        (c) Copyright 1983-2011 Advanced Engineering Software (aes)
            Ver. 18.0  Release Date: 07/01/2011  License ID 1499

                          Analysis prepared by:
```

```
 ************************* DESCRIPTION OF STUDY *************************
* 2400 HIGHLAND                                                        *
* 100 YEAR RECURRENCE INTERVAL                                         *
* PROPOSED CONDITIONS                                                  *
 ************************************************************************

  FILE NAME: CARS100P.DAT
  TIME/DATE OF STUDY: 12:49 11/16/2023
========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =  100.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  12.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED TABLED RAINFALL USED*
  NUMBER OF [TIME,INTENSITY] DATA PAIRS =  9
   1)    5.00;  5.240
   2)   10.00;  3.760
   3)   15.00;  3.030
   4)   30.00;  2.240
   5)   60.00;  1.650
   6)  120.00;  1.130
   7)  180.00;  0.910
   8)  360.00;  0.640
   9)  720.00;  0.420
  *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 0.0312 0.167 0.0150
```

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

****************************************************************************
  FLOW PROCESS FROM NODE    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) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1371.76  DOWNSTREAM(FEET) =   1364.00

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.240
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.10      0.74     0.100    52    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.46
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.46

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1364.00  DOWNSTREAM(FEET) =   1296.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  4918.00   CHANNEL SLOPE =  0.0138
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.030   MAXIMUM DEPTH(FEET) =   0.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.569
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        6.14      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.11
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.27
  AVERAGE FLOW DEPTH(FEET) =   0.20   TRAVEL TIME(MIN.) =  64.33
  Tc(MIN.) =   69.33
```

```
  SUBAREA AREA(ACRES) =     6.14       SUBAREA RUNOFF(CFS) =    8.26
  EFFECTIVE AREA(ACRES) =      6.24     AREA-AVERAGED Fm(INCH/HR) =   0.07
  AREA-AVERAGED Fp(INCH/HR) =   0.74  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        6.2          PEAK FLOW RATE(CFS) =       8.40

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.24   FLOW VELOCITY(FEET/SEC.) =   1.46
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =    5018.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   69.33
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  1.569
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        6.14      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    6.14      SUBAREA RUNOFF(CFS) =    8.26
  EFFECTIVE AREA(ACRES) =     12.38   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       12.4       PEAK FLOW RATE(CFS) =      16.66

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1338.05  DOWNSTREAM(FEET) =   1336.33

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.240
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.10      0.74     0.100    52    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.46
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.46

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  51
```

```
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1336.33  DOWNSTREAM(FEET) =   1312.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   817.00   CHANNEL SLOPE =  0.0298
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.286
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A       12.52      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      24.34
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   4.22
  AVERAGE FLOW DEPTH(FEET) =   0.24   TRAVEL TIME(MIN.) =   3.22
  Tc(MIN.) =    8.22
  SUBAREA AREA(ACRES) =    12.52       SUBAREA RUNOFF(CFS) =   47.45
  EFFECTIVE AREA(ACRES) =     12.62     AREA-AVERAGED Fm(INCH/HR) =   0.07
  AREA-AVERAGED Fp(INCH/HR) =   0.74  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =       12.6          PEAK FLOW RATE(CFS) =      47.83

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.31   FLOW VELOCITY(FEET/SEC.) =   5.03
  LONGEST FLOWPATH FROM NODE    200.00 TO NODE    202.00 =     917.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
  MAINLINE Tc(MIN.) =    8.22
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.286
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A       12.52      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =   12.52      SUBAREA RUNOFF(CFS) =   47.45
  EFFECTIVE AREA(ACRES) =     25.14   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       25.1        PEAK FLOW RATE(CFS) =      95.29

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.240
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.10      0.74     0.100    52    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.46
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.46

********************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1328.53
  CHANNEL LENGTH THRU SUBAREA(FEET) =   201.00   CHANNEL SLOPE =  0.0028
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.215
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.98      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.31
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.97
  AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =   3.46
  Tc(MIN.) =    8.46
  SUBAREA AREA(ACRES) =     0.98       SUBAREA RUNOFF(CFS) =    3.65
  EFFECTIVE AREA(ACRES) =      1.08     AREA-AVERAGED Fm(INCH/HR) =   0.07
  AREA-AVERAGED Fp(INCH/HR) =   0.74  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =       4.02

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.19   FLOW VELOCITY(FEET/SEC.) =   1.08
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =     301.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    302.00 IS CODE =  81
--------------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =    8.46
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.215
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.98      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.98      SUBAREA RUNOFF(CFS) =    3.65
  EFFECTIVE AREA(ACRES) =      2.06   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.1       PEAK FLOW RATE(CFS) =       7.68

********************************************************************************
  FLOW PROCESS FROM NODE    302.00 TO NODE    305.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1321.02  DOWNSTREAM(FEET) =  1319.98
  FLOW LENGTH(FEET) =   208.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.91
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.68
  PIPE TRAVEL TIME(MIN.) =   0.71    Tc(MIN.) =    9.17
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    305.00 =     509.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    305.00 IS CODE =   1
--------------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.17
  RAINFALL INTENSITY(INCH/HR) =   4.01
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       2.06
  TOTAL STREAM AREA(ACRES) =       2.06
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.68

********************************************************************************
  FLOW PROCESS FROM NODE    303.00 TO NODE    304.00 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.240
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.10      0.74     0.100    52    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.46
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.46

********************************************************************************
  FLOW PROCESS FROM NODE    304.00 TO NODE    305.00 IS CODE =  51
--------------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1328.71
  CHANNEL LENGTH THRU SUBAREA(FEET) =   193.00   CHANNEL SLOPE =  0.0020
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.039
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.72      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.76
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.79
  AVERAGE FLOW DEPTH(FEET) =   0.15   TRAVEL TIME(MIN.) =   4.06
  Tc(MIN.) =    9.06
  SUBAREA AREA(ACRES) =     0.72       SUBAREA RUNOFF(CFS) =    2.57
  EFFECTIVE AREA(ACRES) =      0.82     AREA-AVERAGED Fm(INCH/HR) =   0.07
  AREA-AVERAGED Fp(INCH/HR) =   0.74  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.8         PEAK FLOW RATE(CFS) =       2.93

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.18   FLOW VELOCITY(FEET/SEC.) =   0.91
  LONGEST FLOWPATH FROM NODE    303.00 TO NODE    305.00 =     293.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    305.00 IS CODE =  81
--------------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
================================================================================
  MAINLINE Tc(MIN.) =    9.06
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.039
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.72      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.72      SUBAREA RUNOFF(CFS) =    2.57
  EFFECTIVE AREA(ACRES) =      1.54   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.5       PEAK FLOW RATE(CFS) =       5.49

********************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    305.00 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.) =    9.06
  RAINFALL INTENSITY(INCH/HR) =   4.04
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.54
  TOTAL STREAM AREA(ACRES) =       1.54
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       5.49

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        7.68    9.17    4.006  0.74( 0.07) 0.10       2.1     300.00
      2        5.49    9.06    4.039  0.74( 0.07) 0.10       1.5     303.00

  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       13.14    9.06    4.039  0.74( 0.07) 0.10       3.6     303.00
      2       13.13    9.17    4.006  0.74( 0.07) 0.10       3.6     300.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      13.14    Tc(MIN.) =     9.06
  EFFECTIVE AREA(ACRES) =       3.58   AREA-AVERAGED Fm(INCH/HR) =  0.07
```

```
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        3.6
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    305.00 =     509.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    308.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1319.98  DOWNSTREAM(FEET) =  1318.94
  FLOW LENGTH(FEET) =   208.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.56
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      13.14
  PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =    9.68
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    308.00 =     717.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    308.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.68
  RAINFALL INTENSITY(INCH/HR) =   3.85
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       3.58
  TOTAL STREAM AREA(ACRES) =       3.60
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      13.14

****************************************************************************
  FLOW PROCESS FROM NODE    306.00 TO NODE    307.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.240
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
```

```
  COMMERCIAL                  A        0.10      0.74     0.100    52    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.46
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.46

****************************************************************************
  FLOW PROCESS FROM NODE    307.00 TO NODE    308.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1328.18
  CHANNEL LENGTH THRU SUBAREA(FEET) =   201.00   CHANNEL SLOPE =  0.0045
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.425
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  A        1.24      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.91
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.22
  AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =   2.75
  Tc(MIN.) =    7.75
  SUBAREA AREA(ACRES) =     1.24       SUBAREA RUNOFF(CFS) =    4.86
  EFFECTIVE AREA(ACRES) =      1.34     AREA-AVERAGED Fm(INCH/HR) =   0.07
  AREA-AVERAGED Fp(INCH/HR) =   0.74  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.3         PEAK FLOW RATE(CFS) =       5.25

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.19   FLOW VELOCITY(FEET/SEC.) =   1.41
  LONGEST FLOWPATH FROM NODE    306.00 TO NODE    308.00 =     301.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    308.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.75
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.425
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  A        1.24      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.24      SUBAREA RUNOFF(CFS) =    4.86
```

```
  EFFECTIVE AREA(ACRES) =      2.58   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.6       PEAK FLOW RATE(CFS) =      10.10

****************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    308.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.75
  RAINFALL INTENSITY(INCH/HR) =   4.43
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       2.58
  TOTAL STREAM AREA(ACRES) =       2.58
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      10.10

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       13.14    9.68    3.854  0.74( 0.07) 0.10       3.6     303.00
      1       13.13    9.79    3.821  0.74( 0.07) 0.10       3.6     300.00
      2       10.10    7.75    4.425  0.74( 0.07) 0.10       2.6     306.00

  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       22.22    7.75    4.425  0.74( 0.07) 0.10       5.4     306.00
      2       21.92    9.68    3.854  0.74( 0.07) 0.10       6.2     303.00
      3       21.83    9.79    3.821  0.74( 0.07) 0.10       6.2     300.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      22.22    Tc(MIN.) =     7.75
  EFFECTIVE AREA(ACRES) =       5.44   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        6.2
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    308.00 =     717.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    308.00 TO NODE    311.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```

```
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1318.94  DOWNSTREAM(FEET) =  1317.82
  FLOW LENGTH(FEET) =   224.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.38
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      22.22
  PIPE TRAVEL TIME(MIN.) =   0.59    Tc(MIN.) =    8.34
  LONGEST FLOWPATH FROM NODE    300.00 TO NODE    311.00 =     941.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    311.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.34
  RAINFALL INTENSITY(INCH/HR) =   4.25
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       5.44
  TOTAL STREAM AREA(ACRES) =       6.18
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      22.22

****************************************************************************
  FLOW PROCESS FROM NODE    309.00 TO NODE    310.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
==========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1352.60  DOWNSTREAM(FEET) =   1348.30

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.240
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.10      0.74     0.100    52    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.46
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.46

****************************************************************************
  FLOW PROCESS FROM NODE    310.00 TO NODE    311.00 IS CODE =  51
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1348.30  DOWNSTREAM(FEET) =   1328.52
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1374.00   CHANNEL SLOPE =  0.0144
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.899
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.81      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.83
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.83
  AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =  12.48
  Tc(MIN.) =   17.48
  SUBAREA AREA(ACRES) =     1.81       SUBAREA RUNOFF(CFS) =    4.60
  EFFECTIVE AREA(ACRES) =      1.91     AREA-AVERAGED Fm(INCH/HR) =   0.07
  AREA-AVERAGED Fp(INCH/HR) =   0.74  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.9         PEAK FLOW RATE(CFS) =       4.86

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.15   FLOW VELOCITY(FEET/SEC.) =   2.19
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    311.00 =    1474.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    311.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   17.48
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.899
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.81      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.81      SUBAREA RUNOFF(CFS) =    4.60
  EFFECTIVE AREA(ACRES) =      3.72   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        3.7       PEAK FLOW RATE(CFS) =       9.46

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    311.00 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.) =   17.48
  RAINFALL INTENSITY(INCH/HR) =   2.90
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       3.72
  TOTAL STREAM AREA(ACRES) =       3.72
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.46

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       22.22    8.34    4.252  0.74( 0.07) 0.10       5.4     306.00
      1       21.92   10.27    3.721  0.74( 0.07) 0.10       6.2     303.00
      1       21.83   10.38    3.704  0.74( 0.07) 0.10       6.2     300.00
      2        9.46   17.48    2.899  0.74( 0.07) 0.10       3.7     309.00

  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       28.89    8.34    4.252  0.74( 0.07) 0.10       7.2     306.00
      2       29.09   10.27    3.721  0.74( 0.07) 0.10       8.3     303.00
      3       29.04   10.38    3.704  0.74( 0.07) 0.10       8.4     300.00
      4       26.44   17.48    2.899  0.74( 0.07) 0.10       9.9     309.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      29.09    Tc(MIN.) =    10.27
  EFFECTIVE AREA(ACRES) =       8.34   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        9.9
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    311.00 =    1474.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    311.00 TO NODE    314.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1317.82  DOWNSTREAM(FEET) =  1316.86
  FLOW LENGTH(FEET) =   191.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.83
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      29.09
```

```
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =   10.74
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    314.00 =    1665.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    314.00 TO NODE    314.00 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.) =   10.74
  RAINFALL INTENSITY(INCH/HR) =   3.65
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       8.34
  TOTAL STREAM AREA(ACRES) =       9.90
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      29.09

****************************************************************************
  FLOW PROCESS FROM NODE    213.00 TO NODE    313.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.240
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.10      0.74     0.100    52    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.46
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.46

****************************************************************************
  FLOW PROCESS FROM NODE    313.00 TO NODE    314.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1328.42
  CHANNEL LENGTH THRU SUBAREA(FEET) =   201.00   CHANNEL SLOPE =  0.0033
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
```

```
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.302
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.99      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.35
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.06
  AVERAGE FLOW DEPTH(FEET) =   0.15   TRAVEL TIME(MIN.) =   3.17
  Tc(MIN.) =    8.17
  SUBAREA AREA(ACRES) =     0.99       SUBAREA RUNOFF(CFS) =    3.77
  EFFECTIVE AREA(ACRES) =      1.09     AREA-AVERAGED Fm(INCH/HR) =   0.07
  AREA-AVERAGED Fp(INCH/HR) =   0.74  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =       4.15

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.19   FLOW VELOCITY(FEET/SEC.) =   1.19
  LONGEST FLOWPATH FROM NODE    213.00 TO NODE    314.00 =     301.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    314.00 TO NODE    314.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.17
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.302
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.99      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.99      SUBAREA RUNOFF(CFS) =    3.77
  EFFECTIVE AREA(ACRES) =      2.08   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.1       PEAK FLOW RATE(CFS) =       7.91

****************************************************************************
  FLOW PROCESS FROM NODE    314.00 TO NODE    314.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.17
  RAINFALL INTENSITY(INCH/HR) =   4.30
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
```

```
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       2.08
  TOTAL STREAM AREA(ACRES) =       2.08
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.91

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       28.89    8.80    4.114  0.74( 0.07) 0.10       7.2     306.00
      1       29.09   10.74    3.653  0.74( 0.07) 0.10       8.3     303.00
      1       29.04   10.85    3.636  0.74( 0.07) 0.10       8.4     300.00
      1       26.44   17.97    2.874  0.74( 0.07) 0.10       9.9     309.00
      2        7.91    8.17    4.302  0.74( 0.07) 0.10       2.1     213.00

  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       35.96    8.17    4.302  0.74( 0.07) 0.10       8.8     213.00
      2       36.45    8.80    4.114  0.74( 0.07) 0.10       9.3     306.00
      3       35.79   10.74    3.653  0.74( 0.07) 0.10      10.4     303.00
      4       35.71   10.85    3.636  0.74( 0.07) 0.10      10.5     300.00
      5       31.68   17.97    2.874  0.74( 0.07) 0.10      12.0     309.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      36.45    Tc(MIN.) =     8.80
  EFFECTIVE AREA(ACRES) =       9.30   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       12.0
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    314.00 =    1665.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    314.00 TO NODE    317.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1316.86  DOWNSTREAM(FEET) =  1315.82
  FLOW LENGTH(FEET) =   208.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  27.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.00
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      36.45
  PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =    9.30
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    317.00 =    1873.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    317.00 TO NODE    317.00 IS CODE =   1
```

```
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.30
  RAINFALL INTENSITY(INCH/HR) =   3.97
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       9.30
  TOTAL STREAM AREA(ACRES) =      11.98
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      36.45

************************************************************************
  FLOW PROCESS FROM NODE    315.00 TO NODE    316.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.240
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.10      0.74     0.100    52    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.46
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.46

************************************************************************
  FLOW PROCESS FROM NODE    316.00 TO NODE    317.00 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1328.42
  CHANNEL LENGTH THRU SUBAREA(FEET) =   201.00   CHANNEL SLOPE =  0.0033
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.302
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.99      0.74     0.100    52
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.35
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.06
  AVERAGE FLOW DEPTH(FEET) =   0.15   TRAVEL TIME(MIN.) =   3.17
  Tc(MIN.) =    8.17
  SUBAREA AREA(ACRES) =     0.99       SUBAREA RUNOFF(CFS) =    3.77
  EFFECTIVE AREA(ACRES) =      1.09     AREA-AVERAGED Fm(INCH/HR) =   0.07
  AREA-AVERAGED Fp(INCH/HR) =   0.74  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =       4.15

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.19   FLOW VELOCITY(FEET/SEC.) =   1.19
  LONGEST FLOWPATH FROM NODE    315.00 TO NODE    317.00 =     301.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    317.00 TO NODE    317.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.17
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.302
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.99      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.99      SUBAREA RUNOFF(CFS) =    3.77
  EFFECTIVE AREA(ACRES) =      2.08   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.1       PEAK FLOW RATE(CFS) =       7.91

****************************************************************************
  FLOW PROCESS FROM NODE    317.00 TO NODE    317.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.17
  RAINFALL INTENSITY(INCH/HR) =   4.30
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       2.08
  TOTAL STREAM AREA(ACRES) =       2.08
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.91
```

```
 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       35.96    8.66    4.155  0.74( 0.07) 0.10       8.8     213.00
     1       36.45    9.30    3.967  0.74( 0.07) 0.10       9.3     306.00
     1       35.79   11.23    3.580  0.74( 0.07) 0.10      10.4     303.00
     1       35.71   11.34    3.564  0.74( 0.07) 0.10      10.5     300.00
     1       31.68   18.47    2.847  0.74( 0.07) 0.10      12.0     309.00
     2        7.91    8.17    4.302  0.74( 0.07) 0.10       2.1     315.00

 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       43.04    8.17    4.302  0.74( 0.07) 0.10      10.4     315.00
     2       43.60    8.66    4.155  0.74( 0.07) 0.10      10.9     213.00
     3       43.74    9.30    3.967  0.74( 0.07) 0.10      11.4     306.00
     4       42.35   11.23    3.580  0.74( 0.07) 0.10      12.5     303.00
     5       42.24   11.34    3.564  0.74( 0.07) 0.10      12.5     300.00
     6       36.88   18.47    2.847  0.74( 0.07) 0.10      14.1     309.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      43.74    Tc(MIN.) =     9.30
 EFFECTIVE AREA(ACRES) =      11.38   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =       14.1
 LONGEST FLOWPATH FROM NODE    309.00 TO NODE    317.00 =    1873.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    317.00 TO NODE    320.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1315.82  DOWNSTREAM(FEET) =  1314.78
 FLOW LENGTH(FEET) =   207.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  28.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.42
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      43.74
 PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =    9.76
 LONGEST FLOWPATH FROM NODE    309.00 TO NODE    320.00 =    2080.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    320.00 TO NODE    320.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
```

```
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.76
  RAINFALL INTENSITY(INCH/HR) =   3.83
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =      11.38
  TOTAL STREAM AREA(ACRES) =      14.06
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      43.74

****************************************************************************
  FLOW PROCESS FROM NODE    318.00 TO NODE    319.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.240
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.10      0.74     0.100    52    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.46
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.46

****************************************************************************
  FLOW PROCESS FROM NODE    319.00 TO NODE    320.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1328.42
  CHANNEL LENGTH THRU SUBAREA(FEET) =   201.00   CHANNEL SLOPE =  0.0033
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.297
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.07      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.52
```

```
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.05
  AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =   3.18
  Tc(MIN.) =    8.18
  SUBAREA AREA(ACRES) =     1.07       SUBAREA RUNOFF(CFS) =    4.07
  EFFECTIVE AREA(ACRES) =      1.17     AREA-AVERAGED Fm(INCH/HR) =   0.07
  AREA-AVERAGED Fp(INCH/HR) =   0.74  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.2         PEAK FLOW RATE(CFS) =       4.45

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.19   FLOW VELOCITY(FEET/SEC.) =   1.20
  LONGEST FLOWPATH FROM NODE    318.00 TO NODE    320.00 =     301.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    320.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.18
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.297
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.07      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.07      SUBAREA RUNOFF(CFS) =    4.07
  EFFECTIVE AREA(ACRES) =      2.24   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.2       PEAK FLOW RATE(CFS) =       8.51

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    320.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.18
  RAINFALL INTENSITY(INCH/HR) =   4.30
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       2.24
  TOTAL STREAM AREA(ACRES) =       2.24
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       8.51

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
```

```
     1       43.04    8.64    4.164  0.74( 0.07) 0.10      10.4     315.00
     1       43.60    9.13    4.017  0.74( 0.07) 0.10      10.9     213.00
     1       43.74    9.76    3.830  0.74( 0.07) 0.10      11.4     306.00
     1       42.35   11.70    3.512  0.74( 0.07) 0.10      12.5     303.00
     1       42.24   11.81    3.496  0.74( 0.07) 0.10      12.5     300.00
     1       36.88   18.95    2.822  0.74( 0.07) 0.10      14.1     309.00
     2        8.51    8.18    4.297  0.74( 0.07) 0.10       2.2     318.00

  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       50.64    8.18    4.297  0.74( 0.07) 0.10      12.1     318.00
     2       51.29    8.64    4.164  0.74( 0.07) 0.10      12.6     315.00
     3       51.55    9.13    4.017  0.74( 0.07) 0.10      13.1     213.00
     4       51.31    9.76    3.830  0.74( 0.07) 0.10      13.6     306.00
     5       49.28   11.70    3.512  0.74( 0.07) 0.10      14.7     303.00
     6       49.14   11.81    3.496  0.74( 0.07) 0.10      14.8     300.00
     7       42.42   18.95    2.822  0.74( 0.07) 0.10      16.3     309.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      51.55    Tc(MIN.) =     9.13
  EFFECTIVE AREA(ACRES) =      13.10   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       16.3
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    320.00 =    2080.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    320.00 TO NODE    323.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1314.78  DOWNSTREAM(FEET) =  1313.87
  FLOW LENGTH(FEET) =   182.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  29.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.77
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      51.55
  PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =    9.52
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    323.00 =    2262.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    323.00 TO NODE    323.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
```

```
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.52
  RAINFALL INTENSITY(INCH/HR) =   3.90
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =      13.10
  TOTAL STREAM AREA(ACRES) =      16.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      51.55

****************************************************************************
  FLOW PROCESS FROM NODE    321.00 TO NODE    322.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1349.12  DOWNSTREAM(FEET) =   1342.96

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.240
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.10      0.74     0.100    52    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.46
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.46

****************************************************************************
  FLOW PROCESS FROM NODE    322.00 TO NODE    323.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1342.96  DOWNSTREAM(FEET) =   1328.02
  CHANNEL LENGTH THRU SUBAREA(FEET) =   452.00   CHANNEL SLOPE =  0.0331
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.349
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        1.14      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.68
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.50
```

```
 AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   3.01
 Tc(MIN.) =    8.01
 SUBAREA AREA(ACRES) =     1.14       SUBAREA RUNOFF(CFS) =    4.39
 EFFECTIVE AREA(ACRES) =      1.24     AREA-AVERAGED Fm(INCH/HR) =   0.07
 AREA-AVERAGED Fp(INCH/HR) =   0.74  AREA-AVERAGED Ap =   0.10
 TOTAL AREA(ACRES) =        1.2         PEAK FLOW RATE(CFS) =       4.77

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.13   FLOW VELOCITY(FEET/SEC.) =   3.00
 LONGEST FLOWPATH FROM NODE    321.00 TO NODE    323.00 =     552.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    323.00 TO NODE    323.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =    8.01
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.349
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        1.14      0.74     0.100    52
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    1.14      SUBAREA RUNOFF(CFS) =    4.39
 EFFECTIVE AREA(ACRES) =      2.38   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        2.4       PEAK FLOW RATE(CFS) =       9.16

****************************************************************************
 FLOW PROCESS FROM NODE    323.00 TO NODE    323.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    8.01
 RAINFALL INTENSITY(INCH/HR) =   4.35
 AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.74
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       2.38
 TOTAL STREAM AREA(ACRES) =       2.38
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       9.16

 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       50.64    8.58    4.181  0.74( 0.07) 0.10      12.1     318.00
```

```
     1       51.29    9.03    4.048  0.74( 0.07) 0.10      12.6     315.00
     1       51.55    9.52    3.902  0.74( 0.07) 0.10      13.1     213.00
     1       51.31   10.16    3.737  0.74( 0.07) 0.10      13.6     306.00
     1       49.28   12.09    3.455  0.74( 0.07) 0.10      14.7     303.00
     1       49.14   12.20    3.439  0.74( 0.07) 0.10      14.8     300.00
     1       42.42   19.36    2.801  0.74( 0.07) 0.10      16.3     309.00
     2        9.16    8.01    4.349  0.74( 0.07) 0.10       2.4     321.00

  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       58.38    8.01    4.349  0.74( 0.07) 0.10      13.6     321.00
      2       59.44    8.58    4.181  0.74( 0.07) 0.10      14.4     318.00
      3       59.80    9.03    4.048  0.74( 0.07) 0.10      15.0     315.00
      4       59.75    9.52    3.902  0.74( 0.07) 0.10      15.5     213.00
      5       59.15   10.16    3.737  0.74( 0.07) 0.10      16.0     306.00
      6       56.52   12.09    3.455  0.74( 0.07) 0.10      17.1     303.00
      7       56.35   12.20    3.439  0.74( 0.07) 0.10      17.2     300.00
      8       48.26   19.36    2.801  0.74( 0.07) 0.10      18.7     309.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      59.80    Tc(MIN.) =     9.03
  EFFECTIVE AREA(ACRES) =      14.97   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       18.7
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    323.00 =    2262.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    323.00 TO NODE    326.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1313.87  DOWNSTREAM(FEET) =  1312.97
  FLOW LENGTH(FEET) =   180.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  30.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.11
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      59.80
  PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =    9.40
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    326.00 =    2442.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    326.00 TO NODE    326.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
```

```
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.40
  RAINFALL INTENSITY(INCH/HR) =   3.94
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =      14.97
  TOTAL STREAM AREA(ACRES) =      18.68
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      59.80

****************************************************************************
  FLOW PROCESS FROM NODE    324.00 TO NODE    325.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1331.16  DOWNSTREAM(FEET) =   1328.79

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.240
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.10      0.74     0.100    52    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.46
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.46

****************************************************************************
  FLOW PROCESS FROM NODE    325.00 TO NODE    326.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1328.79  DOWNSTREAM(FEET) =   1327.69
  CHANNEL LENGTH THRU SUBAREA(FEET) =    79.00   CHANNEL SLOPE =  0.0139
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.995
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.45      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.46
```

```
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.59
  AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   0.83
  Tc(MIN.) =    5.83
  SUBAREA AREA(ACRES) =     0.45       SUBAREA RUNOFF(CFS) =    1.99
  EFFECTIVE AREA(ACRES) =      0.55     AREA-AVERAGED Fm(INCH/HR) =   0.07
  AREA-AVERAGED Fp(INCH/HR) =   0.74  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.6          PEAK FLOW RATE(CFS) =       2.44

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.12   FLOW VELOCITY(FEET/SEC.) =   1.79
  LONGEST FLOWPATH FROM NODE    324.00 TO NODE    326.00 =     179.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    326.00 TO NODE    326.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.83
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.995
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.45      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.45      SUBAREA RUNOFF(CFS) =    1.99
  EFFECTIVE AREA(ACRES) =      1.00   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.0       PEAK FLOW RATE(CFS) =       4.43

****************************************************************************
  FLOW PROCESS FROM NODE    326.00 TO NODE    326.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.83
  RAINFALL INTENSITY(INCH/HR) =   5.00
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.00
  TOTAL STREAM AREA(ACRES) =       1.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.43

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
```

```
     1       58.38    8.38    4.239  0.74( 0.07) 0.10      13.6     321.00
     1       59.44    8.95    4.072  0.74( 0.07) 0.10      14.4     318.00
     1       59.80    9.40    3.939  0.74( 0.07) 0.10      15.0     315.00
     1       59.75    9.89    3.792  0.74( 0.07) 0.10      15.5     213.00
     1       59.15   10.53    3.683  0.74( 0.07) 0.10      16.0     306.00
     1       56.52   12.47    3.399  0.74( 0.07) 0.10      17.1     303.00
     1       56.35   12.59    3.383  0.74( 0.07) 0.10      17.2     300.00
     1       48.26   19.75    2.780  0.74( 0.07) 0.10      18.7     309.00
     2        4.43    5.83    4.995  0.74( 0.07) 0.10       1.0     324.00

  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       52.39    5.83    4.995  0.74( 0.07) 0.10      10.5     324.00
      2       62.13    8.38    4.239  0.74( 0.07) 0.10      14.6     321.00
      3       63.03    8.95    4.072  0.74( 0.07) 0.10      15.4     318.00
      4       63.28    9.40    3.939  0.74( 0.07) 0.10      16.0     315.00
      5       63.10    9.89    3.792  0.74( 0.07) 0.10      16.5     213.00
      6       62.40   10.53    3.683  0.74( 0.07) 0.10      17.0     306.00
      7       59.52   12.47    3.399  0.74( 0.07) 0.10      18.1     303.00
      8       59.33   12.59    3.383  0.74( 0.07) 0.10      18.2     300.00
      9       50.69   19.75    2.780  0.74( 0.07) 0.10      19.7     309.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      63.28    Tc(MIN.) =     9.40
  EFFECTIVE AREA(ACRES) =      15.97   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       19.7
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    326.00 =    2442.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    326.00 TO NODE    329.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1312.97  DOWNSTREAM(FEET) =  1311.92
  FLOW LENGTH(FEET) =   211.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  31.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.15
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      63.28
  PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =    9.83
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    329.00 =    2653.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    329.00 TO NODE    329.00 IS CODE =   1
```

```
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.83
  RAINFALL INTENSITY(INCH/HR) =   3.81
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =      15.97
  TOTAL STREAM AREA(ACRES) =      19.68
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      63.28

************************************************************************
  FLOW PROCESS FROM NODE    327.00 TO NODE    328.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
========================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1329.44  DOWNSTREAM(FEET) =   1328.65

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.051
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.225
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.10      0.74     0.100    52    5.05
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.46
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.46

************************************************************************
  FLOW PROCESS FROM NODE    328.00 TO NODE    329.00 IS CODE =  51
------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1328.65  DOWNSTREAM(FEET) =   1327.48
  CHANNEL LENGTH THRU SUBAREA(FEET) =    76.00   CHANNEL SLOPE =  0.0154
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.988
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.42      0.74     0.100    52
```

```
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.39
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.58
  AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   0.80
  Tc(MIN.) =    5.85
  SUBAREA AREA(ACRES) =     0.42       SUBAREA RUNOFF(CFS) =    1.86
  EFFECTIVE AREA(ACRES) =      0.52     AREA-AVERAGED Fm(INCH/HR) =   0.07
  AREA-AVERAGED Fp(INCH/HR) =   0.74  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.5         PEAK FLOW RATE(CFS) =       2.30

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.11   FLOW VELOCITY(FEET/SEC.) =   1.87
  LONGEST FLOWPATH FROM NODE    327.00 TO NODE    329.00 =     176.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    329.00 TO NODE    329.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.85
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.988
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.42      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.42      SUBAREA RUNOFF(CFS) =    1.86
  EFFECTIVE AREA(ACRES) =      0.94   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.9       PEAK FLOW RATE(CFS) =       4.16

****************************************************************************
  FLOW PROCESS FROM NODE    329.00 TO NODE    329.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.85
  RAINFALL INTENSITY(INCH/HR) =   4.99
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.94
  TOTAL STREAM AREA(ACRES) =       0.94
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       4.16
```

```
 ** CONFLUENCE DATA **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       52.39    6.28    4.861  0.74( 0.07) 0.10      10.5     324.00
     1       62.13    8.81    4.111  0.74( 0.07) 0.10      14.6     321.00
     1       63.03    9.38    3.944  0.74( 0.07) 0.10      15.4     318.00
     1       63.28    9.83    3.811  0.74( 0.07) 0.10      16.0     315.00
     1       63.10   10.32    3.713  0.74( 0.07) 0.10      16.5     213.00
     1       62.40   10.96    3.620  0.74( 0.07) 0.10      17.0     306.00
     1       59.52   12.91    3.335  0.74( 0.07) 0.10      18.1     303.00
     1       59.33   13.02    3.319  0.74( 0.07) 0.10      18.2     300.00
     1       50.69   20.20    2.756  0.74( 0.07) 0.10      19.7     309.00
     2        4.16    5.85    4.988  0.74( 0.07) 0.10       0.9     327.00

 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       54.27    5.85    4.988  0.74( 0.07) 0.10      10.7     327.00
     2       56.44    6.28    4.861  0.74( 0.07) 0.10      11.4     324.00
     3       65.55    8.81    4.111  0.74( 0.07) 0.10      15.6     321.00
     4       66.31    9.38    3.944  0.74( 0.07) 0.10      16.4     318.00
     5       66.44    9.83    3.811  0.74( 0.07) 0.10      16.9     315.00
     6       66.18   10.32    3.713  0.74( 0.07) 0.10      17.4     213.00
     7       65.40   10.96    3.620  0.74( 0.07) 0.10      17.9     306.00
     8       62.28   12.91    3.335  0.74( 0.07) 0.10      19.1     303.00
     9       62.07   13.02    3.319  0.74( 0.07) 0.10      19.1     300.00
    10       52.96   20.20    2.756  0.74( 0.07) 0.10      20.6     309.00

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      66.44    Tc(MIN.) =     9.83
 EFFECTIVE AREA(ACRES) =      16.91   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =       20.6
 LONGEST FLOWPATH FROM NODE    309.00 TO NODE    329.00 =    2653.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    329.00 TO NODE    336.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1311.92  DOWNSTREAM(FEET) =  1310.58
 FLOW LENGTH(FEET) =   272.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  33.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.15
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      66.44
```

```
  PIPE TRAVEL TIME(MIN.) =   0.56    Tc(MIN.) =   10.38
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    336.00 =    2925.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    330.00 TO NODE    331.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1358.55  DOWNSTREAM(FEET) =   1354.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.240
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.10      0.74     0.100    52    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.46
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.46

****************************************************************************
  FLOW PROCESS FROM NODE    331.00 TO NODE    332.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1354.80  DOWNSTREAM(FEET) =   1335.24
  CHANNEL LENGTH THRU SUBAREA(FEET) =   735.00   CHANNEL SLOPE =  0.0266
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.844
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  COMMERCIAL                  A        1.86      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.65
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.60
  AVERAGE FLOW DEPTH(FEET) =   0.12   TRAVEL TIME(MIN.) =   4.72
  Tc(MIN.) =    9.72
  SUBAREA AREA(ACRES) =     1.86       SUBAREA RUNOFF(CFS) =    6.31
  EFFECTIVE AREA(ACRES) =      1.96     AREA-AVERAGED Fm(INCH/HR) =   0.07
  AREA-AVERAGED Fp(INCH/HR) =   0.74  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        2.0          PEAK FLOW RATE(CFS) =       6.65

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.15   FLOW VELOCITY(FEET/SEC.) =   3.00
  LONGEST FLOWPATH FROM NODE    330.00 TO NODE    332.00 =     835.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    332.00 TO NODE    332.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.72
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.844
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  A        1.86      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    1.86      SUBAREA RUNOFF(CFS) =    6.31
  EFFECTIVE AREA(ACRES) =      3.82   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        3.8       PEAK FLOW RATE(CFS) =      12.96

****************************************************************************
  FLOW PROCESS FROM NODE    332.00 TO NODE    335.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1331.29  DOWNSTREAM(FEET) =  1314.57
  FLOW LENGTH(FEET) =   525.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.22
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.96
  PIPE TRAVEL TIME(MIN.) =   0.78    Tc(MIN.) =   10.50
  LONGEST FLOWPATH FROM NODE    330.00 TO NODE    335.00 =    1360.00 FEET.

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

```
  FLOW PROCESS FROM NODE    335.00 TO NODE    335.00 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.) =   10.50
  RAINFALL INTENSITY(INCH/HR) =   3.69
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       3.82
  TOTAL STREAM AREA(ACRES) =       3.82
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      12.96

****************************************************************************
  FLOW PROCESS FROM NODE    333.00 TO NODE    334.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1344.12  DOWNSTREAM(FEET) =   1340.80

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.240
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.10      0.74     0.100    52    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.46
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.46

****************************************************************************
  FLOW PROCESS FROM NODE    334.00 TO NODE    335.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1340.80  DOWNSTREAM(FEET) =   1326.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   773.00   CHANNEL SLOPE =  0.0185
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.682
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
```

```
  COMMERCIAL                  A        2.46      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.53
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.33
  AVERAGE FLOW DEPTH(FEET) =   0.14   TRAVEL TIME(MIN.) =   5.54
  Tc(MIN.) =   10.54
  SUBAREA AREA(ACRES) =     2.46       SUBAREA RUNOFF(CFS) =    7.99
  EFFECTIVE AREA(ACRES) =      2.56     AREA-AVERAGED Fm(INCH/HR) =   0.07
  AREA-AVERAGED Fp(INCH/HR) =   0.74  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        2.6         PEAK FLOW RATE(CFS) =       8.31

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.18   FLOW VELOCITY(FEET/SEC.) =   2.64
  LONGEST FLOWPATH FROM NODE    333.00 TO NODE    335.00 =     873.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    335.00 TO NODE    335.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   10.54
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.682
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                  A        2.46      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    2.46      SUBAREA RUNOFF(CFS) =    7.99
  EFFECTIVE AREA(ACRES) =      5.02   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        5.0       PEAK FLOW RATE(CFS) =      16.30

****************************************************************************
  FLOW PROCESS FROM NODE    335.00 TO NODE    335.00 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.) =   10.54
  RAINFALL INTENSITY(INCH/HR) =   3.68
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       5.02
  TOTAL STREAM AREA(ACRES) =       5.02
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      16.30
```

```
  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       12.96   10.50    3.688  0.74( 0.07) 0.10       3.8     330.00
      2       16.30   10.54    3.682  0.74( 0.07) 0.10       5.0     333.00

  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       29.22   10.50    3.688  0.74( 0.07) 0.10       8.8     330.00
      2       29.24   10.54    3.682  0.74( 0.07) 0.10       8.8     333.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      29.24    Tc(MIN.) =    10.54
  EFFECTIVE AREA(ACRES) =       8.84   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        8.8
  LONGEST FLOWPATH FROM NODE    330.00 TO NODE    335.00 =    1360.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    335.00 TO NODE    336.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1314.57  DOWNSTREAM(FEET) =  1310.58
  FLOW LENGTH(FEET) =   125.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.73
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      29.24
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   10.69
  LONGEST FLOWPATH FROM NODE    330.00 TO NODE    336.00 =    1485.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       29.22   10.65    3.665  0.74( 0.07) 0.10       8.8     330.00
      2       29.24   10.69    3.660  0.74( 0.07) 0.10       8.8     333.00
  LONGEST FLOWPATH FROM NODE    330.00 TO NODE    336.00 =    1485.00 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       54.27    6.44    4.814  0.74( 0.07) 0.10      10.7     327.00
     2       56.44    6.86    4.688  0.74( 0.07) 0.10      11.4     324.00
     3       65.55    9.37    3.946  0.74( 0.07) 0.10      15.6     321.00
     4       66.31    9.93    3.779  0.74( 0.07) 0.10      16.4     318.00
     5       66.44   10.38    3.704  0.74( 0.07) 0.10      16.9     315.00
     6       66.18   10.88    3.632  0.74( 0.07) 0.10      17.4     213.00
     7       65.40   11.52    3.539  0.74( 0.07) 0.10      17.9     306.00
     8       62.28   13.47    3.254  0.74( 0.07) 0.10      19.1     303.00
     9       62.07   13.58    3.237  0.74( 0.07) 0.10      19.1     300.00
    10       52.96   20.79    2.725  0.74( 0.07) 0.10      20.6     309.00
 LONGEST FLOWPATH FROM NODE    309.00 TO NODE    336.00 =    2925.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)          (ACRES)    NODE
     1       77.59    6.44    4.814  0.74( 0.07) 0.10      16.0     327.00
     2       80.64    6.86    4.688  0.74( 0.07) 0.10      17.1     324.00
     3       93.28    9.37    3.946  0.74( 0.07) 0.10      23.3     321.00
     4       94.44    9.93    3.779  0.74( 0.07) 0.10      24.6     318.00
     5       95.24   10.38    3.704  0.74( 0.07) 0.10      25.5     315.00
     6       95.52   10.65    3.665  0.74( 0.07) 0.10      26.0     330.00
     7       95.52   10.69    3.660  0.74( 0.07) 0.10      26.1     333.00
     8       95.19   10.88    3.632  0.74( 0.07) 0.10      26.3     213.00
     9       93.66   11.52    3.539  0.74( 0.07) 0.10      26.8     306.00
    10       88.20   13.47    3.254  0.74( 0.07) 0.10      27.9     303.00
    11       87.87   13.58    3.237  0.74( 0.07) 0.10      27.9     300.00
    12       74.58   20.79    2.725  0.74( 0.07) 0.10      29.5     309.00
   TOTAL AREA(ACRES) =        29.5

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       95.52  Tc(MIN.) =   10.648
 EFFECTIVE AREA(ACRES) =     26.00  AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =       29.5
 LONGEST FLOWPATH FROM NODE    309.00 TO NODE    336.00 =    2925.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    336.00 TO NODE    336.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    336.00 TO NODE    340.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1310.58  DOWNSTREAM(FEET) =  1308.10
  FLOW LENGTH(FEET) =   685.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  40.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.95
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      95.52
  PIPE TRAVEL TIME(MIN.) =   1.44    Tc(MIN.) =   12.08
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    340.00 =    3610.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    337.00 TO NODE    338.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1327.94

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.240
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.10      0.74     0.100    52    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.46
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.46

****************************************************************************
  FLOW PROCESS FROM NODE    338.00 TO NODE    339.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
```

```
 ELEVATION DATA: UPSTREAM(FEET) =   1327.94  DOWNSTREAM(FEET) =   1321.77
 CHANNEL LENGTH THRU SUBAREA(FEET) =   576.00   CHANNEL SLOPE =  0.0107
 CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
 MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
 * 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                 A        1.69      0.74     0.100    52
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.24
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.67
 AVERAGE FLOW DEPTH(FEET) =   0.14   TRAVEL TIME(MIN.) =   5.76
 Tc(MIN.) =   10.76
 SUBAREA AREA(ACRES) =     1.69       SUBAREA RUNOFF(CFS) =    5.44
 EFFECTIVE AREA(ACRES) =      1.79     AREA-AVERAGED Fm(INCH/HR) =   0.07
 AREA-AVERAGED Fp(INCH/HR) =   0.74  AREA-AVERAGED Ap =   0.10
 TOTAL AREA(ACRES) =        1.8         PEAK FLOW RATE(CFS) =       5.76

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.17   FLOW VELOCITY(FEET/SEC.) =   2.00
 LONGEST FLOWPATH FROM NODE    337.00 TO NODE    339.00 =     676.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    339.00 TO NODE    339.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
 MAINLINE Tc(MIN.) =   10.76
 * 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                 A        1.69      0.74     0.100    52
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    1.69      SUBAREA RUNOFF(CFS) =    5.44
 EFFECTIVE AREA(ACRES) =      3.48   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =        3.5       PEAK FLOW RATE(CFS) =      11.20

****************************************************************************
 FLOW PROCESS FROM NODE    339.00 TO NODE    340.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  1317.75  DOWNSTREAM(FEET) =  1308.10
 FLOW LENGTH(FEET) =   304.00   MANNING'S N =  0.013
```

```
 DEPTH OF FLOW IN  15.0 INCH PIPE IS  12.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.42
 ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      11.20
 PIPE TRAVEL TIME(MIN.) =   0.49    Tc(MIN.) =   11.25
 LONGEST FLOWPATH FROM NODE    337.00 TO NODE    340.00 =     980.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 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       11.20   11.25    3.578  0.74( 0.07) 0.10       3.5     337.00
 LONGEST FLOWPATH FROM NODE    337.00 TO NODE    340.00 =     980.00 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       77.59    7.94    4.370  0.74( 0.07) 0.10      16.0     327.00
     2       80.64    8.36    4.246  0.74( 0.07) 0.10      17.1     324.00
     3       93.28   10.81    3.642  0.74( 0.07) 0.10      23.3     321.00
     4       94.44   11.37    3.560  0.74( 0.07) 0.10      24.6     318.00
     5       95.24   11.82    3.494  0.74( 0.07) 0.10      25.5     315.00
     6       95.52   12.08    3.456  0.74( 0.07) 0.10      26.0     330.00
     7       95.52   12.12    3.450  0.74( 0.07) 0.10      26.1     333.00
     8       95.19   12.31    3.422  0.74( 0.07) 0.10      26.3     213.00
     9       93.66   12.95    3.329  0.74( 0.07) 0.10      26.8     306.00
    10       88.20   14.92    3.042  0.74( 0.07) 0.10      27.9     303.00
    11       87.87   15.03    3.029  0.74( 0.07) 0.10      27.9     300.00
    12       74.58   22.29    2.646  0.74( 0.07) 0.10      29.5     309.00
 LONGEST FLOWPATH FROM NODE    309.00 TO NODE    340.00 =    3610.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1       87.28    7.94    4.370  0.74( 0.07) 0.10      18.5     327.00
     2       90.55    8.36    4.246  0.74( 0.07) 0.10      19.7     324.00
     3      104.23   10.81    3.642  0.74( 0.07) 0.10      26.7     321.00
     4      105.38   11.25    3.578  0.74( 0.07) 0.10      27.8     337.00
     5      105.58   11.37    3.560  0.74( 0.07) 0.10      28.1     318.00
     6      106.17   11.82    3.494  0.74( 0.07) 0.10      29.0     315.00
     7      106.33   12.08    3.456  0.74( 0.07) 0.10      29.5     330.00
     8      106.30   12.12    3.450  0.74( 0.07) 0.10      29.5     333.00
     9      105.89   12.31    3.422  0.74( 0.07) 0.10      29.7     213.00
    10      104.06   12.95    3.329  0.74( 0.07) 0.10      30.3     306.00
    11       97.69   14.92    3.042  0.74( 0.07) 0.10      31.4     303.00
```

```
     12       97.31   15.03    3.029  0.74( 0.07) 0.10      31.4     300.00
     13       82.80   22.29    2.646  0.74( 0.07) 0.10      32.9     309.00
    TOTAL AREA(ACRES) =        32.9

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      106.33  Tc(MIN.) =   12.084
  EFFECTIVE AREA(ACRES) =     29.48  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       32.9
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    340.00 =    3610.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    343.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1308.10  DOWNSTREAM(FEET) =  1305.41
  FLOW LENGTH(FEET) =   447.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  38.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.85
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     106.33
  PIPE TRAVEL TIME(MIN.) =   0.76    Tc(MIN.) =   12.84
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    343.00 =    4057.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    343.00 TO NODE    343.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    343.00 TO NODE    343.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    341.00 TO NODE    342.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
```

```
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.240
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.10      0.74     0.100    52    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.46
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.46

****************************************************************************
  FLOW PROCESS FROM NODE    342.00 TO NODE    343.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1305.41
  CHANNEL LENGTH THRU SUBAREA(FEET) =   727.00   CHANNEL SLOPE =  0.0326
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.315
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        7.39      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      14.67
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.88
  AVERAGE FLOW DEPTH(FEET) =   0.20   TRAVEL TIME(MIN.) =   3.13
  Tc(MIN.) =    8.13
  SUBAREA AREA(ACRES) =     7.39       SUBAREA RUNOFF(CFS) =   28.21
  EFFECTIVE AREA(ACRES) =      7.49     AREA-AVERAGED Fm(INCH/HR) =   0.07
  AREA-AVERAGED Fp(INCH/HR) =   0.74  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        7.5         PEAK FLOW RATE(CFS) =      28.59

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.25   FLOW VELOCITY(FEET/SEC.) =   4.45
  LONGEST FLOWPATH FROM NODE    341.00 TO NODE    343.00 =     827.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    343.00 TO NODE    343.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
```

```
 MAINLINE Tc(MIN.) =    8.13
 * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.315
 SUBAREA LOSS RATE DATA(AMC III):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
 COMMERCIAL                 A        7.39      0.74     0.100    52
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA AREA(ACRES) =    7.39      SUBAREA RUNOFF(CFS) =   28.21
 EFFECTIVE AREA(ACRES) =     14.88   AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
 TOTAL AREA(ACRES) =       14.9       PEAK FLOW RATE(CFS) =      56.79

****************************************************************************
 FLOW PROCESS FROM NODE    343.00 TO NODE    343.00 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       56.79    8.13    4.315  0.74( 0.07) 0.10      14.9     341.00
 LONGEST FLOWPATH FROM NODE    341.00 TO NODE    343.00 =     827.00 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       87.28    8.73    4.136  0.74( 0.07) 0.10      18.5     327.00
     2       90.55    9.15    4.012  0.74( 0.07) 0.10      19.7     324.00
     3      104.23   11.57    3.531  0.74( 0.07) 0.10      26.7     321.00
     4      105.38   12.00    3.468  0.74( 0.07) 0.10      27.8     337.00
     5      105.58   12.13    3.449  0.74( 0.07) 0.10      28.1     318.00
     6      106.17   12.58    3.384  0.74( 0.07) 0.10      29.0     315.00
     7      106.33   12.84    3.345  0.74( 0.07) 0.10      29.5     330.00
     8      106.30   12.88    3.339  0.74( 0.07) 0.10      29.5     333.00
     9      105.89   13.07    3.312  0.74( 0.07) 0.10      29.7     213.00
    10      104.06   13.71    3.218  0.74( 0.07) 0.10      30.3     306.00
    11       97.69   15.68    2.994  0.74( 0.07) 0.10      31.4     303.00
    12       97.31   15.79    2.988  0.74( 0.07) 0.10      31.4     300.00
    13       82.80   23.09    2.604  0.74( 0.07) 0.10      32.9     309.00
 LONGEST FLOWPATH FROM NODE    309.00 TO NODE    343.00 =    4057.00 FEET.

 ** PEAK FLOW RATE TABLE **
  STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
  NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
     1      141.61    8.13    4.315  0.74( 0.07) 0.10      32.1     341.00
     2      141.68    8.73    4.136  0.74( 0.07) 0.10      33.4     327.00
     3      143.28    9.15    4.012  0.74( 0.07) 0.10      34.6     324.00
     4      150.53   11.57    3.531  0.74( 0.07) 0.10      41.6     321.00
```

```
      5      150.82   12.00    3.468  0.74( 0.07) 0.10      42.7     337.00
      6      150.78   12.13    3.449  0.74( 0.07) 0.10      43.0     318.00
      7      150.49   12.58    3.384  0.74( 0.07) 0.10      43.9     315.00
      8      150.14   12.84    3.345  0.74( 0.07) 0.10      44.4     330.00
      9      150.03   12.88    3.339  0.74( 0.07) 0.10      44.4     333.00
     10      149.24   13.07    3.312  0.74( 0.07) 0.10      44.6     213.00
     11      146.16   13.71    3.218  0.74( 0.07) 0.10      45.1     306.00
     12      136.79   15.68    2.994  0.74( 0.07) 0.10      46.3     303.00
     13      136.33   15.79    2.988  0.74( 0.07) 0.10      46.3     300.00
     14      116.67   23.09    2.604  0.74( 0.07) 0.10      47.8     309.00
    TOTAL AREA(ACRES) =        47.8

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      150.82  Tc(MIN.) =   12.003
  EFFECTIVE AREA(ACRES) =     42.68  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       47.8
  LONGEST FLOWPATH FROM NODE    309.00 TO NODE    343.00 =    4057.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    343.00 TO NODE    343.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    400.00 TO NODE    401.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1331.99  DOWNSTREAM(FEET) =   1330.99

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.240
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.10      0.74     0.100    52    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.46
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.46

****************************************************************************
  FLOW PROCESS FROM NODE    401.00 TO NODE    402.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
```

```
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1330.99  DOWNSTREAM(FEET) =   1325.67
  CHANNEL LENGTH THRU SUBAREA(FEET) =   612.00   CHANNEL SLOPE =  0.0087
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.613
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        2.28      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.16
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.70
  AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =   6.01
  Tc(MIN.) =   11.01
  SUBAREA AREA(ACRES) =     2.28       SUBAREA RUNOFF(CFS) =    7.26
  EFFECTIVE AREA(ACRES) =      2.38     AREA-AVERAGED Fm(INCH/HR) =   0.07
  AREA-AVERAGED Fp(INCH/HR) =   0.74  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        2.4         PEAK FLOW RATE(CFS) =       7.58

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.20   FLOW VELOCITY(FEET/SEC.) =   2.00
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    402.00 =     712.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    402.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   11.01
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.613
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        2.28      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    2.28      SUBAREA RUNOFF(CFS) =    7.26
  EFFECTIVE AREA(ACRES) =      4.66   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        4.7       PEAK FLOW RATE(CFS) =      14.84

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    406.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =  1322.57  DOWNSTREAM(FEET) =  1310.63
  FLOW LENGTH(FEET) =    22.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  33.77
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.84
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =   11.02
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    406.00 =     734.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    406.00 TO NODE    406.00 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) =   3.61
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       4.66
  TOTAL STREAM AREA(ACRES) =       4.66
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      14.84

****************************************************************************
  FLOW PROCESS FROM NODE    403.00 TO NODE    404.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1333.09  DOWNSTREAM(FEET) =   1327.13

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.240
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.10      0.74     0.100    52    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.46
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.46

****************************************************************************
  FLOW PROCESS FROM NODE    404.00 TO NODE    405.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
```

```
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1327.13  DOWNSTREAM(FEET) =   1314.38
  CHANNEL LENGTH THRU SUBAREA(FEET) =   506.00   CHANNEL SLOPE =  0.0252
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.907
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.43      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.22
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.87
  AVERAGE FLOW DEPTH(FEET) =   0.08   TRAVEL TIME(MIN.) =   4.50
  Tc(MIN.) =    9.50
  SUBAREA AREA(ACRES) =     0.43       SUBAREA RUNOFF(CFS) =    1.48
  EFFECTIVE AREA(ACRES) =      0.53     AREA-AVERAGED Fm(INCH/HR) =   0.07
  AREA-AVERAGED Fp(INCH/HR) =   0.74  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.5         PEAK FLOW RATE(CFS) =       1.83

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   2.07
  LONGEST FLOWPATH FROM NODE    403.00 TO NODE    405.00 =     606.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    405.00 TO NODE    405.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    9.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  3.907
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.43      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.43      SUBAREA RUNOFF(CFS) =    1.48
  EFFECTIVE AREA(ACRES) =      0.96   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.0       PEAK FLOW RATE(CFS) =       3.31

****************************************************************************
  FLOW PROCESS FROM NODE    405.00 TO NODE    406.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =  1310.90  DOWNSTREAM(FEET) =  1310.63
  FLOW LENGTH(FEET) =    54.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.98
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.31
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =    9.73
  LONGEST FLOWPATH FROM NODE    403.00 TO NODE    406.00 =     660.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    406.00 TO NODE    406.00 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.) =    9.73
  RAINFALL INTENSITY(INCH/HR) =   3.84
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.96
  TOTAL STREAM AREA(ACRES) =       0.96
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       3.31

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       14.84   11.02    3.611  0.74( 0.07) 0.10       4.7     400.00
      2        3.31    9.73    3.840  0.74( 0.07) 0.10       1.0     403.00

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

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       17.26    9.73    3.840  0.74( 0.07) 0.10       5.1     403.00
      2       17.95   11.02    3.611  0.74( 0.07) 0.10       5.6     400.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      17.95    Tc(MIN.) =    11.02
  EFFECTIVE AREA(ACRES) =       5.62   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        5.6
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    406.00 =     734.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    406.00 TO NODE    410.00 IS CODE =  31
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1310.63  DOWNSTREAM(FEET) =  1309.86
  FLOW LENGTH(FEET) =   154.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.02
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.95
  PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =   11.45
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    410.00 =     888.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 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) =   3.55
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       5.62
  TOTAL STREAM AREA(ACRES) =       5.62
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      17.95

****************************************************************************
  FLOW PROCESS FROM NODE    407.00 TO NODE    408.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1333.09  DOWNSTREAM(FEET) =   1329.82

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.240
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.10      0.74     0.100    52    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.46
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.46
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    408.00 TO NODE    409.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.82  DOWNSTREAM(FEET) =   1325.77
  CHANNEL LENGTH THRU SUBAREA(FEET) =    84.00   CHANNEL SLOPE =  0.0482
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.056
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.13      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.76
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.26
  AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   0.62
  Tc(MIN.) =    5.62
  SUBAREA AREA(ACRES) =     0.13       SUBAREA RUNOFF(CFS) =    0.58
  EFFECTIVE AREA(ACRES) =      0.23     AREA-AVERAGED Fm(INCH/HR) =   0.07
  AREA-AVERAGED Fp(INCH/HR) =   0.74  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.2         PEAK FLOW RATE(CFS) =       1.03

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.07   FLOW VELOCITY(FEET/SEC.) =   2.41
  LONGEST FLOWPATH FROM NODE    407.00 TO NODE    409.00 =     184.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    409.00 TO NODE    409.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    5.62
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.056
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.13      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.13      SUBAREA RUNOFF(CFS) =    0.58
  EFFECTIVE AREA(ACRES) =      0.36   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.4       PEAK FLOW RATE(CFS) =       1.61

****************************************************************************
  FLOW PROCESS FROM NODE    409.00 TO NODE    410.00 IS CODE =  31
```

```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1322.82  DOWNSTREAM(FEET) =  1309.86
  FLOW LENGTH(FEET) =    22.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   2.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.74
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.61
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    5.64
  LONGEST FLOWPATH FROM NODE    407.00 TO NODE    410.00 =     206.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    410.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.64
  RAINFALL INTENSITY(INCH/HR) =   5.05
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.36
  TOTAL STREAM AREA(ACRES) =       0.36
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.61

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       17.26   10.16    3.737  0.74( 0.07) 0.10       5.1     403.00
      1       17.95   11.45    3.549  0.74( 0.07) 0.10       5.6     400.00
      2        1.61    5.64    5.051  0.74( 0.07) 0.10       0.4     407.00

  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       14.64    5.64    5.051  0.74( 0.07) 0.10       3.2     407.00
      2       18.45   10.16    3.737  0.74( 0.07) 0.10       5.4     403.00
      3       19.08   11.45    3.549  0.74( 0.07) 0.10       6.0     400.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      19.08    Tc(MIN.) =    11.45
```

```
  EFFECTIVE AREA(ACRES) =       5.98   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        6.0
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    410.00 =     888.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    410.00 TO NODE    424.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1309.86  DOWNSTREAM(FEET) =  1309.34
  FLOW LENGTH(FEET) =   103.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  19.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.10
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.08
  PIPE TRAVEL TIME(MIN.) =   0.28    Tc(MIN.) =   11.73
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    424.00 =     991.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    424.00 TO NODE    424.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    424.00 TO NODE    424.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    411.00 TO NODE    412.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.240
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.10      0.74     0.100    52    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
```

```
  SUBAREA RUNOFF(CFS) =      0.46
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.46

****************************************************************************
  FLOW PROCESS FROM NODE    412.00 TO NODE    413.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1328.53
  CHANNEL LENGTH THRU SUBAREA(FEET) =   202.00   CHANNEL SLOPE =  0.0028
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.193
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.99      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.33
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.95
  AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =   3.54
  Tc(MIN.) =    8.54
  SUBAREA AREA(ACRES) =     0.99       SUBAREA RUNOFF(CFS) =    3.67
  EFFECTIVE AREA(ACRES) =      1.09     AREA-AVERAGED Fm(INCH/HR) =   0.07
  AREA-AVERAGED Fp(INCH/HR) =   0.74  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =       4.04

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.19   FLOW VELOCITY(FEET/SEC.) =   1.09
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    413.00 =     302.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    413.00 TO NODE    413.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.54
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.193
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.99      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.99      SUBAREA RUNOFF(CFS) =    3.67
  EFFECTIVE AREA(ACRES) =      2.08   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.1       PEAK FLOW RATE(CFS) =       7.71
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    413.00 TO NODE    416.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1323.25  DOWNSTREAM(FEET) =  1321.34
  FLOW LENGTH(FEET) =   208.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.15
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.71
  PIPE TRAVEL TIME(MIN.) =   0.56    Tc(MIN.) =    9.10
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    416.00 =     510.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    416.00 TO NODE    416.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.10
  RAINFALL INTENSITY(INCH/HR) =   4.03
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       2.08
  TOTAL STREAM AREA(ACRES) =       2.08
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.71

****************************************************************************
  FLOW PROCESS FROM NODE    414.00 TO NODE    415.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.240
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.10      0.74     0.100    52    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
```

```
  SUBAREA RUNOFF(CFS) =      0.46
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.46

****************************************************************************
  FLOW PROCESS FROM NODE    415.00 TO NODE    416.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1328.53
  CHANNEL LENGTH THRU SUBAREA(FEET) =   203.00   CHANNEL SLOPE =  0.0028
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.187
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.99      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.33
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.95
  AVERAGE FLOW DEPTH(FEET) =   0.16   TRAVEL TIME(MIN.) =   3.56
  Tc(MIN.) =    8.56
  SUBAREA AREA(ACRES) =     0.99       SUBAREA RUNOFF(CFS) =    3.66
  EFFECTIVE AREA(ACRES) =      1.09     AREA-AVERAGED Fm(INCH/HR) =   0.07
  AREA-AVERAGED Fp(INCH/HR) =   0.74  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =       4.03

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.19   FLOW VELOCITY(FEET/SEC.) =   1.09
  LONGEST FLOWPATH FROM NODE    414.00 TO NODE    416.00 =     303.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    416.00 TO NODE    416.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.56
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.187
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.99      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.99      SUBAREA RUNOFF(CFS) =    3.66
  EFFECTIVE AREA(ACRES) =      2.08   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        2.1       PEAK FLOW RATE(CFS) =       7.70
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    416.00 TO NODE    416.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.56
  RAINFALL INTENSITY(INCH/HR) =   4.19
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       2.08
  TOTAL STREAM AREA(ACRES) =       2.08
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       7.70

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        7.71    9.10    4.026  0.74( 0.07) 0.10       2.1     411.00
      2        7.70    8.56    4.187  0.74( 0.07) 0.10       2.1     414.00

  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       15.25    8.56    4.187  0.74( 0.07) 0.10       4.0     414.00
      2       15.11    9.10    4.026  0.74( 0.07) 0.10       4.2     411.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      15.25    Tc(MIN.) =     8.56
  EFFECTIVE AREA(ACRES) =       4.04   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        4.2
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    416.00 =     510.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    416.00 TO NODE    419.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1321.34  DOWNSTREAM(FEET) =  1319.26
  FLOW LENGTH(FEET) =   209.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  17.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.30
```

```
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      15.25
  PIPE TRAVEL TIME(MIN.) =   0.48    Tc(MIN.) =    9.03
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    419.00 =     719.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    419.00 TO NODE    419.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.03
  RAINFALL INTENSITY(INCH/HR) =   4.05
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       4.04
  TOTAL STREAM AREA(ACRES) =       4.16
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      15.25

****************************************************************************
  FLOW PROCESS FROM NODE    417.00 TO NODE    418.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.09

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.240
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.10      0.74     0.100    52    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.46
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.46

****************************************************************************
  FLOW PROCESS FROM NODE    418.00 TO NODE    419.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.09  DOWNSTREAM(FEET) =   1328.53
  CHANNEL LENGTH THRU SUBAREA(FEET) =   193.00   CHANNEL SLOPE =  0.0029
```

```
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.226
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.83      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.03
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   0.94
  AVERAGE FLOW DEPTH(FEET) =   0.15   TRAVEL TIME(MIN.) =   3.43
  Tc(MIN.) =    8.43
  SUBAREA AREA(ACRES) =     0.83       SUBAREA RUNOFF(CFS) =    3.10
  EFFECTIVE AREA(ACRES) =      0.93     AREA-AVERAGED Fm(INCH/HR) =   0.07
  AREA-AVERAGED Fp(INCH/HR) =   0.74  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.9         PEAK FLOW RATE(CFS) =       3.47

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.18   FLOW VELOCITY(FEET/SEC.) =   1.08
  LONGEST FLOWPATH FROM NODE    417.00 TO NODE    419.00 =     293.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    419.00 TO NODE    419.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    8.43
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.226
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.83      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.83      SUBAREA RUNOFF(CFS) =    3.10
  EFFECTIVE AREA(ACRES) =      1.76   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.8       PEAK FLOW RATE(CFS) =       6.58

****************************************************************************
  FLOW PROCESS FROM NODE    419.00 TO NODE    419.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.43
  RAINFALL INTENSITY(INCH/HR) =   4.23
```

```
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.76
  TOTAL STREAM AREA(ACRES) =       1.76
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.58

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       15.25    9.03    4.046  0.74( 0.07) 0.10       4.0     414.00
      1       15.11    9.58    3.885  0.74( 0.07) 0.10       4.2     411.00
      2        6.58    8.43    4.226  0.74( 0.07) 0.10       1.8     417.00

  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       21.44    8.43    4.226  0.74( 0.07) 0.10       5.5     417.00
      2       21.54    9.03    4.046  0.74( 0.07) 0.10       5.8     414.00
      3       21.15    9.58    3.885  0.74( 0.07) 0.10       5.9     411.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      21.54    Tc(MIN.) =     9.03
  EFFECTIVE AREA(ACRES) =       5.80   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        5.9
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    419.00 =     719.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    419.00 TO NODE    423.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1319.26  DOWNSTREAM(FEET) =  1310.69
  FLOW LENGTH(FEET) =   607.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.31
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.54
  PIPE TRAVEL TIME(MIN.) =   1.09    Tc(MIN.) =   10.12
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    423.00 =    1326.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    423.00 TO NODE    423.00 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.) =   10.12
  RAINFALL INTENSITY(INCH/HR) =   3.74
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       5.80
  TOTAL STREAM AREA(ACRES) =       5.92
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      21.54

****************************************************************************
  FLOW PROCESS FROM NODE    420.00 TO NODE    421.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1333.33  DOWNSTREAM(FEET) =   1330.07

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.240
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.10      0.74     0.100    52    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.46
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.46

****************************************************************************
  FLOW PROCESS FROM NODE    421.00 TO NODE    422.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1330.07  DOWNSTREAM(FEET) =   1326.90
  CHANNEL LENGTH THRU SUBAREA(FEET) =   168.00   CHANNEL SLOPE =  0.0189
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.731
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.26      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
```

```
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.01
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.63
  AVERAGE FLOW DEPTH(FEET) =   0.08   TRAVEL TIME(MIN.) =   1.72
  Tc(MIN.) =    6.72
  SUBAREA AREA(ACRES) =     0.26       SUBAREA RUNOFF(CFS) =    1.09
  EFFECTIVE AREA(ACRES) =      0.36     AREA-AVERAGED Fm(INCH/HR) =   0.07
  AREA-AVERAGED Fp(INCH/HR) =   0.74  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.4         PEAK FLOW RATE(CFS) =       1.51

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.09   FLOW VELOCITY(FEET/SEC.) =   1.71
  LONGEST FLOWPATH FROM NODE    420.00 TO NODE    422.00 =     268.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    422.00 TO NODE    422.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.72
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.731
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.26      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.26      SUBAREA RUNOFF(CFS) =    1.09
  EFFECTIVE AREA(ACRES) =      0.62   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.6       PEAK FLOW RATE(CFS) =       2.60

****************************************************************************
  FLOW PROCESS FROM NODE    422.00 TO NODE    423.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1324.00  DOWNSTREAM(FEET) =  1310.69
  FLOW LENGTH(FEET) =    22.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 12.000
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   2.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.75
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.60
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    6.74
  LONGEST FLOWPATH FROM NODE    420.00 TO NODE    423.00 =     290.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    423.00 TO NODE    423.00 IS CODE =   1
----------------------------------------------------------------------------
```

```
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.74
  RAINFALL INTENSITY(INCH/HR) =   4.73
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.62
  TOTAL STREAM AREA(ACRES) =       0.62
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       2.60

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       21.44    9.51    3.904  0.74( 0.07) 0.10       5.5     417.00
      1       21.54   10.12    3.742  0.74( 0.07) 0.10       5.8     414.00
      1       21.15   10.67    3.663  0.74( 0.07) 0.10       5.9     411.00
      2        2.60    6.74    4.726  0.74( 0.07) 0.10       0.6     420.00

  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       21.04    6.74    4.726  0.74( 0.07) 0.10       4.5     420.00
      2       23.58    9.51    3.904  0.74( 0.07) 0.10       6.1     417.00
      3       23.59   10.12    3.742  0.74( 0.07) 0.10       6.4     414.00
      4       23.15   10.67    3.663  0.74( 0.07) 0.10       6.5     411.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      23.59    Tc(MIN.) =    10.12
  EFFECTIVE AREA(ACRES) =       6.42   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        6.5
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    423.00 =    1326.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    423.00 TO NODE    424.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1310.69  DOWNSTREAM(FEET) =  1309.34
  FLOW LENGTH(FEET) =    38.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.48
```

```
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      23.59
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   10.17
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    424.00 =    1364.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    424.00 TO NODE    424.00 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       21.04    6.78    4.712  0.74( 0.07) 0.10       4.5     420.00
      2       23.58    9.56    3.890  0.74( 0.07) 0.10       6.1     417.00
      3       23.59   10.17    3.736  0.74( 0.07) 0.10       6.4     414.00
      4       23.15   10.71    3.656  0.74( 0.07) 0.10       6.5     411.00
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    424.00 =    1364.00 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       14.64    5.94    4.961  0.74( 0.07) 0.10       3.2     407.00
      2       18.45   10.44    3.696  0.74( 0.07) 0.10       5.4     403.00
      3       19.08   11.73    3.508  0.74( 0.07) 0.10       6.0     400.00
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    424.00 =     991.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       34.05    5.94    4.961  0.74( 0.07) 0.10       7.1     407.00
      2       36.39    6.78    4.712  0.74( 0.07) 0.10       8.1     420.00
      3       41.28    9.56    3.890  0.74( 0.07) 0.10      11.1     417.00
      4       41.80   10.17    3.736  0.74( 0.07) 0.10      11.7     414.00
      5       41.82   10.44    3.696  0.74( 0.07) 0.10      11.9     403.00
      6       41.73   10.71    3.656  0.74( 0.07) 0.10      12.1     411.00
      7       41.27   11.73    3.508  0.74( 0.07) 0.10      12.5     400.00
    TOTAL AREA(ACRES) =        12.5

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       41.82  Tc(MIN.) =   10.441
  EFFECTIVE AREA(ACRES) =     11.91  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       12.5
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    424.00 =    1364.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    424.00 TO NODE    424.00 IS CODE =  12
----------------------------------------------------------------------------
```

```
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
================================================================================

********************************************************************************
  FLOW PROCESS FROM NODE    424.00 TO NODE    431.00 IS CODE =  31
--------------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1309.34  DOWNSTREAM(FEET) =  1302.92
  FLOW LENGTH(FEET) =   310.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.44
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      41.82
  PIPE TRAVEL TIME(MIN.) =   0.42    Tc(MIN.) =   10.86
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    431.00 =    1674.00 FEET.

********************************************************************************
  FLOW PROCESS FROM NODE    431.00 TO NODE    431.00 IS CODE =  10
--------------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
================================================================================

********************************************************************************
  FLOW PROCESS FROM NODE    431.00 TO NODE    431.00 IS CODE =  13
--------------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
================================================================================

********************************************************************************
  FLOW PROCESS FROM NODE    425.00 TO NODE    426.00 IS CODE =  21
--------------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
================================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1330.09  DOWNSTREAM(FEET) =   1329.13

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.240
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.10      0.74     0.100    52    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.46
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.46
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    426.00 TO NODE    427.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1329.13  DOWNSTREAM(FEET) =   1312.52
  CHANNEL LENGTH THRU SUBAREA(FEET) =   402.00   CHANNEL SLOPE =  0.0413
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.460
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.73      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.90
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.54
  AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =   2.63
  Tc(MIN.) =    7.63
  SUBAREA AREA(ACRES) =     0.73       SUBAREA RUNOFF(CFS) =    2.88
  EFFECTIVE AREA(ACRES) =      0.83     AREA-AVERAGED Fm(INCH/HR) =   0.07
  AREA-AVERAGED Fp(INCH/HR) =   0.74  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.8         PEAK FLOW RATE(CFS) =       3.28

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.11   FLOW VELOCITY(FEET/SEC.) =   2.75
  LONGEST FLOWPATH FROM NODE    425.00 TO NODE    427.00 =     502.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    427.00 TO NODE    427.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.63
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.460
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.73      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.73      SUBAREA RUNOFF(CFS) =    2.88
  EFFECTIVE AREA(ACRES) =      1.56   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.6       PEAK FLOW RATE(CFS) =       6.16

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

```
  FLOW PROCESS FROM NODE    427.00 TO NODE    430.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1309.00  DOWNSTREAM(FEET) =  1305.31
  FLOW LENGTH(FEET) =   191.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS   9.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.72
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.16
  PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =    8.05
  LONGEST FLOWPATH FROM NODE    425.00 TO NODE    430.00 =     693.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    430.00 TO NODE    430.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.05
  RAINFALL INTENSITY(INCH/HR) =   4.34
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       1.56
  TOTAL STREAM AREA(ACRES) =       1.56
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       6.16

****************************************************************************
  FLOW PROCESS FROM NODE    428.00 TO NODE    429.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1322.64  DOWNSTREAM(FEET) =   1318.64

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.240
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.10      0.74     0.100    52    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.46
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.46
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    429.00 TO NODE    430.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1318.64  DOWNSTREAM(FEET) =   1314.94
  CHANNEL LENGTH THRU SUBAREA(FEET) =   138.00   CHANNEL SLOPE =  0.0268
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.822
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.09      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.66
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.63
  AVERAGE FLOW DEPTH(FEET) =   0.06   TRAVEL TIME(MIN.) =   1.41
  Tc(MIN.) =    6.41
  SUBAREA AREA(ACRES) =     0.09       SUBAREA RUNOFF(CFS) =    0.38
  EFFECTIVE AREA(ACRES) =      0.19     AREA-AVERAGED Fm(INCH/HR) =   0.07
  AREA-AVERAGED Fp(INCH/HR) =   0.74  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.2         PEAK FLOW RATE(CFS) =       0.81

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.07   FLOW VELOCITY(FEET/SEC.) =   1.60
  LONGEST FLOWPATH FROM NODE    428.00 TO NODE    430.00 =     238.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    430.00 TO NODE    430.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    6.41
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.822
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.09      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.09      SUBAREA RUNOFF(CFS) =    0.38
  EFFECTIVE AREA(ACRES) =      0.28   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.3       PEAK FLOW RATE(CFS) =       1.20

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

```
  FLOW PROCESS FROM NODE    430.00 TO NODE    430.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.41
  RAINFALL INTENSITY(INCH/HR) =   4.82
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.28
  TOTAL STREAM AREA(ACRES) =       0.28
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.20

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        6.16    8.05    4.338  0.74( 0.07) 0.10       1.6     425.00
      2        1.20    6.41    4.822  0.74( 0.07) 0.10       0.3     428.00

  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        6.66    6.41    4.822  0.74( 0.07) 0.10       1.5     428.00
      2        7.23    8.05    4.338  0.74( 0.07) 0.10       1.8     425.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       7.23    Tc(MIN.) =     8.05
  EFFECTIVE AREA(ACRES) =       1.84   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.8
  LONGEST FLOWPATH FROM NODE    425.00 TO NODE    430.00 =     693.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    430.00 TO NODE    431.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1305.31  DOWNSTREAM(FEET) =  1302.92
  FLOW LENGTH(FEET) =   124.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  10.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.96
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.23
```

```
  PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =    8.31
  LONGEST FLOWPATH FROM NODE    425.00 TO NODE    431.00 =     817.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    431.00 TO NODE    431.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        6.66    6.68    4.744  0.74( 0.07) 0.10       1.5     428.00
      2        7.23    8.31    4.261  0.74( 0.07) 0.10       1.8     425.00
  LONGEST FLOWPATH FROM NODE    425.00 TO NODE    431.00 =     817.00 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       34.05    6.37    4.835  0.74( 0.07) 0.10       7.1     407.00
      2       36.39    7.21    4.587  0.74( 0.07) 0.10       8.1     420.00
      3       41.28    9.98    3.767  0.74( 0.07) 0.10      11.1     417.00
      4       41.80   10.58    3.675  0.74( 0.07) 0.10      11.7     414.00
      5       41.82   10.86    3.635  0.74( 0.07) 0.10      11.9     403.00
      6       41.73   11.13    3.595  0.74( 0.07) 0.10      12.1     411.00
      7       41.27   12.14    3.447  0.74( 0.07) 0.10      12.5     400.00
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    431.00 =    1674.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       40.53    6.37    4.835  0.74( 0.07) 0.10       8.6     407.00
      2       41.57    6.68    4.744  0.74( 0.07) 0.10       9.0     428.00
      3       43.23    7.21    4.587  0.74( 0.07) 0.10       9.8     420.00
      4       45.56    8.31    4.261  0.74( 0.07) 0.10      11.2     425.00
      5       47.66    9.98    3.767  0.74( 0.07) 0.10      13.0     417.00
      6       48.02   10.58    3.675  0.74( 0.07) 0.10      13.6     414.00
      7       47.97   10.86    3.635  0.74( 0.07) 0.10      13.8     403.00
      8       47.82   11.13    3.595  0.74( 0.07) 0.10      13.9     411.00
      9       47.10   12.14    3.447  0.74( 0.07) 0.10      14.4     400.00
    TOTAL AREA(ACRES) =        14.4

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       48.02  Tc(MIN.) =   10.583
  EFFECTIVE AREA(ACRES) =     13.55  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       14.4
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    431.00 =    1674.00 FEET.

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

```
  FLOW PROCESS FROM NODE    431.00 TO NODE    431.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    431.00 TO NODE    437.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1302.92  DOWNSTREAM(FEET) =  1294.50
  FLOW LENGTH(FEET) =   379.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.51
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      48.02
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =   11.05
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    437.00 =    2053.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    437.00 TO NODE    437.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    437.00 TO NODE    437.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    432.00 TO NODE    433.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1334.00  DOWNSTREAM(FEET) =   1333.15

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.240
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.10      0.74     0.100    52    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
```

```
  SUBAREA RUNOFF(CFS) =      0.46
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.46

****************************************************************************
  FLOW PROCESS FROM NODE    433.00 TO NODE    434.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1333.15  DOWNSTREAM(FEET) =   1299.66
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2503.00   CHANNEL SLOPE =  0.0134
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.407
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        2.63      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.42
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.91
  AVERAGE FLOW DEPTH(FEET) =   0.13   TRAVEL TIME(MIN.) =  21.83
  Tc(MIN.) =   26.83
  SUBAREA AREA(ACRES) =     2.63       SUBAREA RUNOFF(CFS) =    5.52
  EFFECTIVE AREA(ACRES) =      2.73     AREA-AVERAGED Fm(INCH/HR) =   0.07
  AREA-AVERAGED Fp(INCH/HR) =   0.74  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        2.7         PEAK FLOW RATE(CFS) =       5.73

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   2.18
  LONGEST FLOWPATH FROM NODE    432.00 TO NODE    434.00 =    2603.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    434.00 TO NODE    434.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   26.83
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.407
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        2.63      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    2.63      SUBAREA RUNOFF(CFS) =    5.52
  EFFECTIVE AREA(ACRES) =      5.36   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        5.4       PEAK FLOW RATE(CFS) =      11.25
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    434.00 TO NODE    437.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  1295.87  DOWNSTREAM(FEET) =  1294.50
  FLOW LENGTH(FEET) =   275.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.40
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      11.25
  PIPE TRAVEL TIME(MIN.) =   0.85    Tc(MIN.) =   27.68
  LONGEST FLOWPATH FROM NODE    432.00 TO NODE    437.00 =    2878.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    437.00 TO NODE    437.00 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       11.25   27.68    2.362  0.74( 0.07) 0.10       5.4     432.00
  LONGEST FLOWPATH FROM NODE    432.00 TO NODE    437.00 =    2878.00 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       40.53    6.86    4.689  0.74( 0.07) 0.10       8.6     407.00
      2       41.57    7.17    4.598  0.74( 0.07) 0.10       9.0     428.00
      3       43.23    7.70    4.442  0.74( 0.07) 0.10       9.8     420.00
      4       45.56    8.78    4.121  0.74( 0.07) 0.10      11.2     425.00
      5       47.66   10.45    3.695  0.74( 0.07) 0.10      13.0     417.00
      6       48.02   11.05    3.607  0.74( 0.07) 0.10      13.6     414.00
      7       47.97   11.32    3.567  0.74( 0.07) 0.10      13.8     403.00
      8       47.82   11.60    3.527  0.74( 0.07) 0.10      13.9     411.00
      9       47.10   12.61    3.378  0.74( 0.07) 0.10      14.4     400.00
  LONGEST FLOWPATH FROM NODE    411.00 TO NODE    437.00 =    2053.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       46.16    6.86    4.689  0.74( 0.07) 0.10       9.9     407.00
      2       47.33    7.17    4.598  0.74( 0.07) 0.10      10.4     428.00
      3       49.21    7.70    4.442  0.74( 0.07) 0.10      11.2     420.00
      4       51.88    8.78    4.121  0.74( 0.07) 0.10      12.9     425.00
      5       54.38   10.45    3.695  0.74( 0.07) 0.10      15.0     417.00
```

```
      6       54.96   11.05    3.607  0.74( 0.07) 0.10      15.7     414.00
      7       55.00   11.32    3.567  0.74( 0.07) 0.10      15.9     403.00
      8       54.93   11.60    3.527  0.74( 0.07) 0.10      16.2     411.00
      9       54.50   12.61    3.378  0.74( 0.07) 0.10      16.8     400.00
     10       43.86   27.68    2.362  0.74( 0.07) 0.10      19.7     432.00
    TOTAL AREA(ACRES) =        19.7

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       55.00  Tc(MIN.) =   11.324
  EFFECTIVE AREA(ACRES) =     15.94  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       19.7
  LONGEST FLOWPATH FROM NODE    432.00 TO NODE    437.00 =    2878.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    437.00 TO NODE    437.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    437.00 TO NODE    437.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    437.00 TO NODE    437.00 IS CODE =  13
----------------------------------------------------------------------------
  >>>>>CLEAR THE MAIN-STREAM MEMORY<<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    435.00 TO NODE    436.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1328.83  DOWNSTREAM(FEET) =   1322.08

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.240
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.10      0.74     0.100    52    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
```

```
  SUBAREA RUNOFF(CFS) =      0.46
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.46

****************************************************************************
  FLOW PROCESS FROM NODE    436.00 TO NODE    437.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1322.08  DOWNSTREAM(FEET) =   1294.50
  CHANNEL LENGTH THRU SUBAREA(FEET) =   568.00   CHANNEL SLOPE =  0.0486
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.441
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        2.59      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.58
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.51
  AVERAGE FLOW DEPTH(FEET) =   0.13   TRAVEL TIME(MIN.) =   2.70
  Tc(MIN.) =    7.70
  SUBAREA AREA(ACRES) =     2.59       SUBAREA RUNOFF(CFS) =   10.18
  EFFECTIVE AREA(ACRES) =      2.69     AREA-AVERAGED Fm(INCH/HR) =   0.07
  AREA-AVERAGED Fp(INCH/HR) =   0.74  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        2.7         PEAK FLOW RATE(CFS) =      10.57

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.16   FLOW VELOCITY(FEET/SEC.) =   4.02
  LONGEST FLOWPATH FROM NODE    435.00 TO NODE    437.00 =     668.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    437.00 TO NODE    437.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =    7.70
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  4.441
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        2.59      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    2.59      SUBAREA RUNOFF(CFS) =   10.18
  EFFECTIVE AREA(ACRES) =      5.28   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        5.3       PEAK FLOW RATE(CFS) =      20.75
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    437.00 TO NODE    437.00 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       20.75    7.70    4.441  0.74( 0.07) 0.10       5.3     435.00
  LONGEST FLOWPATH FROM NODE    435.00 TO NODE    437.00 =     668.00 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       46.16    6.86    4.689  0.74( 0.07) 0.10       9.9     407.00
      2       47.33    7.17    4.598  0.74( 0.07) 0.10      10.4     428.00
      3       49.21    7.70    4.442  0.74( 0.07) 0.10      11.2     420.00
      4       51.88    8.78    4.121  0.74( 0.07) 0.10      12.9     425.00
      5       54.38   10.45    3.695  0.74( 0.07) 0.10      15.0     417.00
      6       54.96   11.05    3.607  0.74( 0.07) 0.10      15.7     414.00
      7       55.00   11.32    3.567  0.74( 0.07) 0.10      15.9     403.00
      8       54.93   11.60    3.527  0.74( 0.07) 0.10      16.2     411.00
      9       54.50   12.61    3.378  0.74( 0.07) 0.10      16.8     400.00
     10       43.86   27.68    2.362  0.74( 0.07) 0.10      19.7     432.00
  LONGEST FLOWPATH FROM NODE    432.00 TO NODE    437.00 =    2878.00 FEET.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1       65.70    6.86    4.689  0.74( 0.07) 0.10      14.6     407.00
      2       67.35    7.17    4.598  0.74( 0.07) 0.10      15.3     428.00
      3       69.95    7.70    4.442  0.74( 0.07) 0.10      16.5     420.00
      4       69.96    7.70    4.441  0.74( 0.07) 0.10      16.5     435.00
      5       71.11    8.78    4.121  0.74( 0.07) 0.10      18.1     425.00
      6       71.59   10.45    3.695  0.74( 0.07) 0.10      20.3     417.00
      7       71.75   11.05    3.607  0.74( 0.07) 0.10      21.0     414.00
      8       71.59   11.32    3.567  0.74( 0.07) 0.10      21.2     403.00
      9       71.34   11.60    3.527  0.74( 0.07) 0.10      21.5     411.00
     10       70.20   12.61    3.378  0.74( 0.07) 0.10      22.1     400.00
     11       54.74   27.68    2.362  0.74( 0.07) 0.10      25.0     432.00
    TOTAL AREA(ACRES) =        25.0

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       71.75  Tc(MIN.) =   11.051
  EFFECTIVE AREA(ACRES) =     20.97  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =       25.0
  LONGEST FLOWPATH FROM NODE    432.00 TO NODE    437.00 =    2878.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    437.00 TO NODE    437.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    500.00 TO NODE    501.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  ELEVATION DATA: UPSTREAM(FEET) =   1335.00  DOWNSTREAM(FEET) =   1333.18

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.000
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  5.240
  SUBAREA Tc AND LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 A        0.10      0.74     0.100    52    5.00
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.46
  TOTAL AREA(ACRES) =      0.10   PEAK FLOW RATE(CFS) =      0.46

****************************************************************************
  FLOW PROCESS FROM NODE    501.00 TO NODE    502.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1333.18  DOWNSTREAM(FEET) =   1298.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2797.00   CHANNEL SLOPE =  0.0126
  CHANNEL BASE(FEET) =    0.00   "Z" FACTOR =  99.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   0.50
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.081
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.67      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.10
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.41
  AVERAGE FLOW DEPTH(FEET) =   0.09   TRAVEL TIME(MIN.) =  33.07
  Tc(MIN.) =   38.07
  SUBAREA AREA(ACRES) =     0.67       SUBAREA RUNOFF(CFS) =    1.21
```

```
  EFFECTIVE AREA(ACRES) =      0.77     AREA-AVERAGED Fm(INCH/HR) =   0.07
  AREA-AVERAGED Fp(INCH/HR) =   0.74  AREA-AVERAGED Ap =   0.10
  TOTAL AREA(ACRES) =        0.8         PEAK FLOW RATE(CFS) =       1.39

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.10   FLOW VELOCITY(FEET/SEC.) =   1.51
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    502.00 =    2897.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    502.00 TO NODE    502.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  MAINLINE Tc(MIN.) =   38.07
  * 100 YEAR RAINFALL INTENSITY(INCH/HR) =  2.081
  SUBAREA LOSS RATE DATA(AMC III):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN
  COMMERCIAL                 A        0.67      0.74     0.100    52
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.74
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA AREA(ACRES) =    0.67      SUBAREA RUNOFF(CFS) =    1.21
  EFFECTIVE AREA(ACRES) =      1.44   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.4       PEAK FLOW RATE(CFS) =       2.60
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.4  TC(MIN.) =     38.07
  EFFECTIVE AREA(ACRES) =      1.44  AREA-AVERAGED Fm(INCH/HR)=  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.74  AREA-AVERAGED Ap = 0.100
  PEAK FLOW RATE(CFS)   =       2.60
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```



APPENDIX F

HYDROGRAPH DATA

BMP #1 - BASIN A HYDROGRAPH DATA

HYDROGRAPH BASIN A

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 25.14
SOIL-LOSS RATE, Fm,(INCH/HR) = 0.041
LOW LOSS FRACTION = 0.057
TIME OF CONCENTRATION(MIN.) = 8.22
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) = 0.44
30-MINUTE POINT RAINFALL VALUE(INCHES) = 1.12
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.65
3-HOUR POINT RAINFALL VALUE(INCHES) = 2.74
6-HOUR POINT RAINFALL VALUE(INCHES) = 3.82
24-HOUR POINT RAINFALL VALUE(INCHES) = 7.04

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 12.54
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 2.21

****

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	25.0	50.0	75.0	100.0
0.11	0.0156	2.76	.Q	.	.	.	.
0.24	0.0470	2.77	.Q	.	.	.	.
0.38	0.0784	2.78	.Q	.	.	.	.
0.52	0.1101	2.80	.Q	.	.	.	.
0.66	0.1418	2.81	.Q	.	.	.	.
0.79	0.1738	2.83	.Q	.	.	.	.
0.93	0.2059	2.84	.Q	.	.	.	.
1.07	0.2381	2.86	.Q	.	.	.	.
1.20	0.2706	2.87	.Q	.	.	.	.
1.34	0.3031	2.89	.Q	.	.	.	.
1.48	0.3359	2.90	.Q	.	.	.	.
1.61	0.3688	2.92	.Q	.	.	.	.
1.75	0.4019	2.93	.Q	.	.	.	.
1.89	0.4352	2.95	.Q	.	.	.	.
2.03	0.4687	2.96	.Q	.	.	.	.
2.16	0.5023	2.98	.Q	.	.	.	.
2.30	0.5362	2.99	.Q	.	.	.	.
2.44	0.5702	3.02	.Q	.	.	.	.
2.57	0.6044	3.03	.Q	.	.	.	.
2.71	0.6388	3.05	.Q	.	.	.	.
2.85	0.6734	3.06	.Q	.	.	.	.
2.98	0.7082	3.09	.Q	.	.	.	.

3.12	0.7432	3.10	.Q	.	.	.	.
3.26	0.7784	3.12	.Q	.	.	.	.
3.40	0.8139	3.13	.Q	.	.	.	.
3.53	0.8495	3.16	.Q	.	.	.	.
3.67	0.8853	3.17	.Q	.	.	.	.
3.81	0.9214	3.20	.Q	.	.	.	.
3.94	0.9577	3.21	.Q	.	.	.	.
4.08	0.9942	3.24	.Q	.	.	.	.
4.22	1.0310	3.25	.Q	.	.	.	.
4.36	1.0680	3.28	.Q	.	.	.	.
4.49	1.1053	3.30	.Q	.	.	.	.
4.63	1.1427	3.33	.Q	.	.	.	.
4.77	1.1805	3.34	.Q	.	.	.	.
4.90	1.2185	3.37	.Q	.	.	.	.
5.04	1.2567	3.39	.Q	.	.	.	.
5.18	1.2953	3.42	.Q	.	.	.	.
5.31	1.3341	3.43	.Q	.	.	.	.
5.45	1.3731	3.47	.Q	.	.	.	.
5.59	1.4125	3.48	.Q	.	.	.	.
5.72	1.4521	3.52	.Q	.	.	.	.
5.86	1.4920	3.54	.Q	.	.	.	.
6.00	1.5323	3.57	.Q	.	.	.	.
6.14	1.5728	3.59	.Q	.	.	.	.
6.27	1.6137	3.63	.Q	.	.	.	.
6.41	1.6548	3.65	.Q	.	.	.	.
6.55	1.6963	3.68	.Q	.	.	.	.
6.68	1.7381	3.70	.Q	.	.	.	.
6.82	1.7803	3.74	.Q	.	.	.	.
6.96	1.8228	3.77	.Q	.	.	.	.
7.09	1.8657	3.81	.Q	.	.	.	.
7.23	1.9089	3.83	.Q	.	.	.	.
7.37	1.9526	3.87	.Q	.	.	.	.
7.51	1.9966	3.90	.Q	.	.	.	.
7.64	2.0409	3.94	.Q	.	.	.	.
7.78	2.0857	3.97	.Q	.	.	.	.
7.92	2.1309	4.02	.Q	.	.	.	.
8.05	2.1766	4.04	.Q	.	.	.	.
8.19	2.2226	4.09	.Q	.	.	.	.
8.33	2.2692	4.12	.Q	.	.	.	.
8.47	2.3161	4.18	.Q	.	.	.	.
8.60	2.3636	4.20	.Q	.	.	.	.
8.74	2.4115	4.26	.Q	.	.	.	.
8.88	2.4600	4.29	.Q	.	.	.	.
9.01	2.5089	4.35	.Q	.	.	.	.
9.15	2.5584	4.39	.Q	.	.	.	.
9.29	2.6084	4.45	.Q	.	.	.	.
9.42	2.6590	4.49	.Q	.	.	.	.
9.56	2.7102	4.55	.Q	.	.	.	.
9.70	2.7620	4.59	.Q	.	.	.	.
9.84	2.8144	4.67	.Q	.	.	.	.

9.97	2.8674	4.70	.Q . . . .
10.11	2.9211	4.78	.Q . . . .
10.25	2.9755	4.82	.Q . . . .
10.38	3.0306	4.91	.Q . . . .
10.52	3.0865	4.96	.Q . . . .
10.66	3.1431	5.05	. Q . . . .
10.79	3.2005	5.10	. Q . . . .
10.93	3.2588	5.20	. Q . . . .
11.07	3.3179	5.25	. Q . . . .
11.20	3.3779	5.36	. Q . . . .
11.34	3.4389	5.41	. Q . . . .
11.48	3.5009	5.53	. Q . . . .
11.62	3.5639	5.59	. Q . . . .
11.75	3.6279	5.72	. Q . . . .
11.89	3.6931	5.79	. Q . . . .
12.03	3.7596	5.94	. Q . . . .
12.16	3.8296	6.43	. Q . . . .
12.30	3.9039	6.70	. Q . . . .
12.44	3.9802	6.78	. Q . . . .
12.57	4.0580	6.96	. Q . . . .
12.71	4.1374	7.06	. Q . . . .
12.85	4.2185	7.26	. Q . . . .
12.99	4.3014	7.37	. Q . . . .
13.12	4.3862	7.61	. Q . . . .
13.26	4.4730	7.73	. Q . . . .
13.40	4.5621	8.00	. Q . . . .
13.53	4.6535	8.14	. Q . . . .
13.67	4.7475	8.46	. Q . . . .
13.81	4.8442	8.63	. Q . . . .
13.95	4.9441	9.01	. Q . . . .
14.08	5.0472	9.21	. Q . . . .
14.22	5.1521	9.32	. Q . . . .
14.36	5.2591	9.58	. Q . . . .
14.49	5.3708	10.15	. Q . . . .
14.63	5.4876	10.48	. Q . . . .
14.77	5.6105	11.23	. Q . . . .
14.90	5.7402	11.67	. Q . . . .
15.04	5.8783	12.73	. Q . . . .
15.18	6.0261	13.37	. Q . . . .
15.32	6.1865	14.98	. Q . . . .
15.45	6.3685	17.15	. Q . . . .
15.59	6.5943	22.74	. Q. . . .
15.73	6.8642	24.94	. Q. . . .
15.86	7.1813	31.08	. . Q . . .
16.00	7.5850	40.23	. . Q . . .
16.14	8.3380	92.78	. . . . Q .
16.27	9.0155	26.89	. Q . . . .
16.41	9.2869	21.05	. Q . . . .
16.55	9.4859	14.11	. Q . . . .
16.68	9.6347	12.17	. Q . . . .

16.82	9.7649	10.84	. Q	.	.	.	.
16.96	9.8820	9.85	. Q	.	.	.	.
17.10	9.9895	9.12	. Q	.	.	.	.
17.23	10.0910	8.81	. Q	.	.	.	.
17.37	10.1878	8.30	. Q	.	.	.	.
17.51	10.2793	7.86	. Q	.	.	.	.
17.64	10.3662	7.49	. Q	.	.	.	.
17.78	10.4491	7.16	. Q	.	.	.	.
17.92	10.5286	6.87	. Q	.	.	.	.
18.06	10.6049	6.61	. Q	.	.	.	.
18.19	10.6756	5.86	. Q	.	.	.	.
18.33	10.7408	5.66	. Q	.	.	.	.
18.47	10.8038	5.47	. Q	.	.	.	.
18.60	10.8648	5.30	. Q	.	.	.	.
18.74	10.9240	5.14	. Q	.	.	.	.
18.88	10.9814	5.00	. Q	.	.	.	.
19.01	11.0373	4.87	.Q	.	.	.	.
19.15	11.0917	4.74	.Q	.	.	.	.
19.29	11.1447	4.63	.Q	.	.	.	.
19.42	11.1965	4.52	.Q	.	.	.	.
19.56	11.2471	4.42	.Q	.	.	.	.
19.70	11.2966	4.32	.Q	.	.	.	.
19.84	11.3450	4.23	.Q	.	.	.	.
19.97	11.3925	4.15	.Q	.	.	.	.
20.11	11.4390	4.07	.Q	.	.	.	.
20.25	11.4846	3.99	.Q	.	.	.	.
20.38	11.5294	3.92	.Q	.	.	.	.
20.52	11.5734	3.85	.Q	.	.	.	.
20.66	11.6167	3.79	.Q	.	.	.	.
20.80	11.6592	3.72	.Q	.	.	.	.
20.93	11.7010	3.66	.Q	.	.	.	.
21.07	11.7422	3.61	.Q	.	.	.	.
21.21	11.7827	3.55	.Q	.	.	.	.
21.34	11.8227	3.50	.Q	.	.	.	.
21.48	11.8620	3.45	.Q	.	.	.	.
21.62	11.9008	3.40	.Q	.	.	.	.
21.75	11.9391	3.36	.Q	.	.	.	.
21.89	11.9768	3.31	.Q	.	.	.	.
22.03	12.0141	3.27	.Q	.	.	.	.
22.17	12.0508	3.23	.Q	.	.	.	.
22.30	12.0871	3.19	.Q	.	.	.	.
22.44	12.1230	3.15	.Q	.	.	.	.
22.58	12.1584	3.11	.Q	.	.	.	.
22.71	12.1934	3.07	.Q	.	.	.	.
22.85	12.2280	3.04	.Q	.	.	.	.
22.99	12.2622	3.00	.Q	.	.	.	.
23.12	12.2961	2.97	.Q	.	.	.	.
23.26	12.3295	2.94	.Q	.	.	.	.
23.40	12.3626	2.91	.Q	.	.	.	.
23.53	12.3954	2.88	.Q	.	.	.	.

23.67	12.4278	2.85	.Q	.	.	.	.
23.81	12.4599	2.82	.Q	.	.	.	.
23.95	12.4917	2.79	.Q	.	.	.	.
24.08	12.5232	2.77	.Q	.	.	.	.
24.22	12.5388	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%	1446.7
10%	172.6
20%	57.5
30%	24.7
40%	16.4
50%	8.2
60%	8.2
70%	8.2
80%	8.2
90%	8.2

BMP #2 - BASIN B HYDROGRAPH DATA

HYDROGRAPH BASIN B

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 47.73
SOIL-LOSS RATE, Fm,(INCH/HR) = 0.011
LOW LOSS FRACTION = 0.040
TIME OF CONCENTRATION(MIN.) = 12.00
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) = 0.44
30-MINUTE POINT RAINFALL VALUE(INCHES) = 1.12
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.65
3-HOUR POINT RAINFALL VALUE(INCHES) = 2.74
6-HOUR POINT RAINFALL VALUE(INCHES) = 3.82
24-HOUR POINT RAINFALL VALUE(INCHES) = 7.04

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 24.30
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 3.70

****

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	37.5	75.0	112.5	150.0
0.20	0.0442	5.35	.Q	.	.	.	.
0.40	0.1328	5.37	.Q	.	.	.	.
0.60	0.2220	5.42	.Q	.	.	.	.
0.80	0.3119	5.45	.Q	.	.	.	.
1.00	0.4024	5.50	.Q	.	.	.	.
1.20	0.4936	5.53	.Q	.	.	.	.
1.40	0.5855	5.59	.Q	.	.	.	.
1.60	0.6780	5.61	.Q	.	.	.	.
1.80	0.7713	5.67	.Q	.	.	.	.
2.00	0.8653	5.70	.Q	.	.	.	.
2.20	0.9601	5.76	.Q	.	.	.	.
2.40	1.0556	5.79	.Q	.	.	.	.
2.60	1.1519	5.86	.Q	.	.	.	.
2.80	1.2490	5.89	.Q	.	.	.	.
3.00	1.3469	5.96	.Q	.	.	.	.
3.20	1.4457	5.99	.Q	.	.	.	.
3.40	1.5453	6.06	.Q	.	.	.	.
3.60	1.6458	6.10	.Q	.	.	.	.
3.80	1.7471	6.17	.Q	.	.	.	.
4.00	1.8494	6.21	.Q	.	.	.	.
4.20	1.9527	6.28	.Q	.	.	.	.
4.40	2.0569	6.32	.Q	.	.	.	.

4.60	2.1621	6.41	.Q	.	.	.	.
4.80	2.2683	6.45	.Q	.	.	.	.
5.00	2.3756	6.53	.Q	.	.	.	.
5.20	2.4840	6.58	.Q	.	.	.	.
5.40	2.5934	6.67	.Q	.	.	.	.
5.60	2.7040	6.72	.Q	.	.	.	.
5.80	2.8158	6.81	.Q	.	.	.	.
6.00	2.9288	6.86	.Q	.	.	.	.
6.20	3.0431	6.96	.Q	.	.	.	.
6.40	3.1586	7.02	.Q	.	.	.	.
6.60	3.2755	7.13	.Q	.	.	.	.
6.80	3.3938	7.18	.Q	.	.	.	.
7.00	3.5134	7.30	.Q	.	.	.	.
7.20	3.6346	7.36	.Q	.	.	.	.
7.40	3.7572	7.48	.Q	.	.	.	.
7.60	3.8814	7.55	. Q	.	.	.	.
7.80	4.0073	7.68	. Q	.	.	.	.
8.00	4.1349	7.75	. Q	.	.	.	.
8.20	4.2642	7.90	. Q	.	.	.	.
8.40	4.3953	7.97	. Q	.	.	.	.
8.60	4.5284	8.13	. Q	.	.	.	.
8.80	4.6634	8.21	. Q	.	.	.	.
9.00	4.8005	8.38	. Q	.	.	.	.
9.20	4.9397	8.47	. Q	.	.	.	.
9.40	5.0812	8.65	. Q	.	.	.	.
9.60	5.2251	8.75	. Q	.	.	.	.
9.80	5.3714	8.96	. Q	.	.	.	.
10.00	5.5203	9.06	. Q	.	.	.	.
10.20	5.6720	9.29	. Q	.	.	.	.
10.40	5.8265	9.41	. Q	.	.	.	.
10.60	5.9841	9.66	. Q	.	.	.	.
10.80	6.1448	9.79	. Q	.	.	.	.
11.00	6.3090	10.07	. Q	.	.	.	.
11.20	6.4767	10.22	. Q	.	.	.	.
11.40	6.6482	10.54	. Q	.	.	.	.
11.60	6.8239	10.71	. Q	.	.	.	.
11.80	7.0039	11.07	. Q	.	.	.	.
12.00	7.1885	11.27	. Q	.	.	.	.
12.20	7.3870	12.75	. Q	.	.	.	.
12.40	7.5998	12.99	. Q	.	.	.	.
12.60	7.8189	13.51	. Q	.	.	.	.
12.80	8.0446	13.80	. Q	.	.	.	.
13.00	8.2778	14.42	. Q	.	.	.	.
13.20	8.5189	14.76	. Q	.	.	.	.
13.40	8.7691	15.51	. Q	.	.	.	.
13.60	9.0290	15.94	. Q	.	.	.	.
13.80	9.3003	16.89	. Q	.	.	.	.
14.00	9.5839	17.43	. Q	.	.	.	.
14.20	9.8765	17.98	. Q	.	.	.	.
14.40	10.1796	18.70	. Q	.	.	.	.

```
 14.60     10.5030     20.43  .    Q    .         .         .         .
 14.80     10.8494     21.48  .    Q    .         .         .         .
 15.00     11.2263     24.13  .     Q   .         .         .         .
 15.20     11.6394     25.85  .     Q   .         .         .         .
 15.40     12.1063     30.65  .       Q .         .         .         .
 15.60     12.6991     41.09  .         Q         .         .         .
 15.80     13.4680     51.94  .         .  Q      .         .         .
 16.00     14.4329     64.82  .         .      Q  .         .         .
 16.20     16.1933    148.19  .         .         .         .         Q.
 16.40     17.7982     46.00  .         . Q       .         .         .
 16.60     18.4094     27.96  .      Q  .         .         .         .
 16.80     18.8281     22.70  .     Q   .         .         .         .
 17.00     19.1769     19.51  .    Q    .         .         .         .
 17.20     19.4871     18.02  .   Q     .         .         .         .
 17.40     19.7715     16.39  .   Q     .         .         .         .
 17.60     20.0320     15.12  .   Q     .         .         .         .
 17.80     20.2735     14.10  .  Q      .         .         .         .
 18.00     20.4994     13.25  .  Q      .         .         .         .
 18.20     20.7038     11.48  .  Q      .         .         .         .
 18.40     20.8886     10.89  . Q       .         .         .         .
 18.60     21.0643     10.38  . Q       .         .         .         .
 18.80     21.2322      9.93  . Q       .         .         .         .
 19.00     21.3930      9.53  . Q       .         .         .         .
 19.20     21.5476      9.17  . Q       .         .         .         .
 19.40     21.6965      8.85  . Q       .         .         .         .
 19.60     21.8404      8.56  . Q       .         .         .         .
 19.80     21.9797      8.29  . Q       .         .         .         .
 20.00     22.1148      8.05  . Q       .         .         .         .
 20.20     22.2459      7.82  . Q       .         .         .         .
 20.40     22.3735      7.61  . Q       .         .         .         .
 20.60     22.4978      7.42  .Q        .         .         .         .
 20.80     22.6189      7.24  .Q        .         .         .         .
 21.00     22.7372      7.07  .Q        .         .         .         .
 21.20     22.8527      6.91  .Q        .         .         .         .
 21.40     22.9658      6.76  .Q        .         .         .         .
 21.60     23.0764      6.62  .Q        .         .         .         .
 21.80     23.1847      6.49  .Q        .         .         .         .
 22.00     23.2910      6.36  .Q        .         .         .         .
 22.20     23.3952      6.25  .Q        .         .         .         .
 22.40     23.4975      6.13  .Q        .         .         .         .
 22.60     23.5980      6.03  .Q        .         .         .         .
 22.80     23.6968      5.92  .Q        .         .         .         .
 23.00     23.7939      5.83  .Q        .         .         .         .
 23.20     23.8894      5.73  .Q        .         .         .         .
 23.40     23.9834      5.64  .Q        .         .         .         .
 23.60     24.0760      5.56  .Q        .         .         .         .
 23.80     24.1672      5.48  .Q        .         .         .         .
 24.00     24.2571      5.40  .Q        .         .         .         .
 24.20     24.3017      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%	1440.0
10%	264.0
20%	72.0
30%	48.0
40%	24.0
50%	12.0
60%	12.0
70%	12.0
80%	12.0
90%	12.0

BMP #3 - BASIN C HYDROGRAPH DATA

HYDROGRAPH BASIN C

RATIONAL METHOD CALIBRATION COEFFICIENT = 0.90
TOTAL CATCHMENT AREA(ACRES) = 24.95
SOIL-LOSS RATE, Fm,(INCH/HR) = 0.036
LOW LOSS FRACTION = 0.054
TIME OF CONCENTRATION(MIN.) = 11.05
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) = 0.44
30-MINUTE POINT RAINFALL VALUE(INCHES) = 1.12
1-HOUR POINT RAINFALL VALUE(INCHES) = 1.65
3-HOUR POINT RAINFALL VALUE(INCHES) = 2.74
6-HOUR POINT RAINFALL VALUE(INCHES) = 3.82
24-HOUR POINT RAINFALL VALUE(INCHES) = 7.04

TOTAL CATCHMENT RUNOFF VOLUME(ACRE-FEET) = 12.49
TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) = 2.15

****

TIME (HOURS)	VOLUME (AF)	Q (CFS)	0.	22.5	45.0	67.5	90.0
0.16	0.0209	2.75	.Q	.	.	.	.
0.35	0.0629	2.77	.Q	.	.	.	.
0.53	0.1052	2.78	.Q	.	.	.	.
0.71	0.1477	2.81	.Q	.	.	.	.
0.90	0.1905	2.82	.Q	.	.	.	.
1.08	0.2336	2.84	.Q	.	.	.	.
1.27	0.2770	2.86	.Q	.	.	.	.
1.45	0.3207	2.88	.Q	.	.	.	.
1.63	0.3647	2.90	.Q	.	.	.	.
1.82	0.4090	2.93	.Q	.	.	.	.
2.00	0.4537	2.94	.Q	.	.	.	.
2.19	0.4986	2.97	.Q	.	.	.	.
2.37	0.5439	2.98	.Q	.	.	.	.
2.56	0.5896	3.01	.Q	.	.	.	.
2.74	0.6355	3.03	.Q	.	.	.	.
2.92	0.6819	3.06	.Q	.	.	.	.
3.11	0.7286	3.08	.Q	.	.	.	.
3.29	0.7757	3.11	.Q	.	.	.	.
3.48	0.8231	3.13	.Q	.	.	.	.
3.66	0.8709	3.16	.Q	.	.	.	.
3.84	0.9192	3.18	.Q	.	.	.	.
4.03	0.9678	3.21	.Q	.	.	.	.

4.21	1.0168	3.23	.Q	.	.	.	.
4.40	1.0663	3.27	.Q	.	.	.	.
4.58	1.1162	3.29	.Q	.	.	.	.
4.77	1.1666	3.33	.Q	.	.	.	.
4.95	1.2174	3.35	.Q	.	.	.	.
5.13	1.2687	3.39	.Q	.	.	.	.
5.32	1.3204	3.41	.Q	.	.	.	.
5.50	1.3727	3.46	.Q	.	.	.	.
5.69	1.4255	3.48	.Q	.	.	.	.
5.87	1.4788	3.52	.Q	.	.	.	.
6.05	1.5326	3.55	.Q	.	.	.	.
6.24	1.5870	3.60	.Q	.	.	.	.
6.42	1.6419	3.62	.Q	.	.	.	.
6.61	1.6974	3.67	.Q	.	.	.	.
6.79	1.7536	3.70	.Q	.	.	.	.
6.98	1.8103	3.76	.Q	.	.	.	.
7.16	1.8677	3.78	.Q	.	.	.	.
7.34	1.9257	3.84	.Q	.	.	.	.
7.53	1.9845	3.87	.Q	.	.	.	.
7.71	2.0439	3.94	.Q	.	.	.	.
7.90	2.1041	3.97	.Q	.	.	.	.
8.08	2.1650	4.04	.Q	.	.	.	.
8.27	2.2267	4.07	.Q	.	.	.	.
8.45	2.2892	4.14	.Q	.	.	.	.
8.63	2.3526	4.18	.Q	.	.	.	.
8.82	2.4168	4.26	.Q	.	.	.	.
9.00	2.4820	4.30	.Q	.	.	.	.
9.19	2.5480	4.38	.Q	.	.	.	.
9.37	2.6151	4.43	.Q	.	.	.	.
9.55	2.6832	4.52	. Q	.	.	.	.
9.74	2.7524	4.57	. Q	.	.	.	.
9.92	2.8227	4.67	. Q	.	.	.	.
10.11	2.8941	4.72	. Q	.	.	.	.
10.29	2.9668	4.83	. Q	.	.	.	.
10.48	3.0408	4.89	. Q	.	.	.	.
10.66	3.1161	5.01	. Q	.	.	.	.
10.84	3.1929	5.07	. Q	.	.	.	.
11.03	3.2711	5.21	. Q	.	.	.	.
11.21	3.3510	5.28	. Q	.	.	.	.
11.40	3.4325	5.43	. Q	.	.	.	.
11.58	3.5158	5.51	. Q	.	.	.	.
11.76	3.6010	5.68	. Q	.	.	.	.
11.95	3.6882	5.78	. Q	.	.	.	.
12.13	3.7799	6.27	. Q	.	.	.	.
12.32	3.8779	6.60	. Q	.	.	.	.
12.50	3.9801	6.83	. Q	.	.	.	.
12.68	4.0849	6.95	. Q	.	.	.	.
12.87	4.1928	7.22	. Q	.	.	.	.
13.05	4.3038	7.37	. Q	.	.	.	.
13.24	4.4183	7.69	. Q	.	.	.	.

13.42	4.5367	7.86	. Q . . . .
13.61	4.6593	8.25	. Q . . . .
13.79	4.7866	8.47	. Q . . . .
13.97	4.9192	8.96	. Q . . . .
14.16	5.0570	9.14	. Q . . . .
14.34	5.1991	9.54	. Q . . . .
14.53	5.3471	9.91	. Q . . . .
14.71	5.5048	10.81	. Q . . . .
14.90	5.6734	11.35	. Q . . . .
15.08	5.8566	12.72	. Q . . . .
15.26	6.0569	13.61	. Q . . . .
15.45	6.2955	17.75	. Q . . . .
15.63	6.5958	21.72	. Q. . . .
15.82	6.9688	27.28	. . Q . . .
16.00	7.4403	34.68	. . Q . . .
16.18	8.3132	80.00	. . . . Q .
16.37	9.1076	24.38	. Q . . . .
16.55	9.4052	14.73	. Q . . . .
16.74	9.6085	11.98	. Q . . . .
16.92	9.7783	10.33	. Q . . . .
17.11	9.9269	9.20	. Q . . . .
17.29	10.0632	8.71	. Q . . . .
17.47	10.1907	8.05	. Q . . . .
17.66	10.3092	7.52	. Q . . . .
17.84	10.4203	7.08	. Q . . . .
18.03	10.5253	6.71	. Q . . . .
18.21	10.6210	5.87	. Q . . . .
18.39	10.7083	5.60	. Q . . . .
18.58	10.7917	5.36	. Q . . . .
18.76	10.8716	5.14	. Q . . . .
18.95	10.9483	4.95	. Q . . . .
19.13	11.0223	4.77	. Q . . . .
19.32	11.0938	4.62	. Q . . . .
19.50	11.1630	4.47	.Q . . . .
19.68	11.2301	4.34	.Q . . . .
19.87	11.2952	4.22	.Q . . . .
20.05	11.3586	4.11	.Q . . . .
20.24	11.4203	4.00	.Q . . . .
20.42	11.4805	3.91	.Q . . . .
20.60	11.5392	3.81	.Q . . . .
20.79	11.5966	3.73	.Q . . . .
20.97	11.6528	3.65	.Q . . . .
21.16	11.7077	3.57	.Q . . . .
21.34	11.7615	3.50	.Q . . . .
21.52	11.8143	3.43	.Q . . . .
21.71	11.8661	3.37	.Q . . . .
21.89	11.9169	3.31	.Q . . . .
22.08	11.9668	3.25	.Q . . . .
22.26	12.0159	3.20	.Q . . . .
22.45	12.0641	3.14	.Q . . . .

22.63	12.1116	3.09	.Q	.	.	.	.
22.81	12.1583	3.04	.Q	.	.	.	.
23.00	12.2042	3.00	.Q	.	.	.	.
23.18	12.2495	2.95	.Q	.	.	.	.
23.37	12.2942	2.91	.Q	.	.	.	.
23.55	12.3382	2.87	.Q	.	.	.	.
23.73	12.3816	2.83	.Q	.	.	.	.
23.92	12.4244	2.79	.Q	.	.	.	.
24.10	12.4666	2.76	.Q	.	.	.	.
24.29	12.4876	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%	1447.6
10%	243.1
20%	66.3
30%	44.2
40%	22.1
50%	11.1
60%	11.1
70%	11.1
80%	11.1
90%	11.1

APPENDIX G

COUNTY OF SAN BERNARDINO HYDROLOGY MANUAL EXCERPTS

COUNTY OF SAN BERNARDINO HYDROLOGY MANUAL, PAGES C-6 TO C-9, C-15

Curve (1) Numbers of Hydrologic Soil-Cover Complexes For Pervious Areas-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group A	B	C	D
NATURAL COVERS -					
Barren (Rockland, eroded and graded land)		78	86	91	93
Chaparral, Broadleaf (Manzonita, ceanothus and scrub oak)	Poor	53	70	80	85
	Fair	40	63	75	81
	Good	31	57	71	78
Chaparral, Narrowleaf (Chamise and redshank)	Poor	71	82	88	91
	Fair	55	72	81	86
Grass, Annual or Perennial	Poor	67	78	86	89
	Fair	50	69	79	84
	Good	38	61	74	80
Meadows or Cienegas (Areas with seasonally high water table, principal vegetation is sod forming grass)	Poor	63	77	85	88
	Fair	51	70	80	84
	Good	30	58	71	78
Open Brush (Soft wood shrubs - buckwheat, sage, etc.)	Poor	62	76	84	88
	Fair	46	66	77	83
	Good	41	63	75	81
Woodland (Coniferous or broadleaf trees predominate. Canopy density is at least 50 percent.)	Poor	45	66	77	83
	Fair	36	60	73	79
	Good	25	55	70	77
Woodland, Grass (Coniferous or broadleaf trees with canopy density from 20 to 50 percent)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
URBAN COVERS -					
Residential or Commercial Landscaping (Lawn, shrubs, etc.)	Good	32	56	69	75
Turf (Irrigated and mowed grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
AGRICULTURAL COVERS -					
Fallow (Land plowed but not tilled or seeded)		77	86	91	94

SAN BERNARDINO COUNTY

HYDROLOGY MANUAL

CURVE NUMBERS FOR PERVIOUS AREAS

Figure C-3 (1 of 2)

Curve (1) Numbers of Hydrologic Soil-Cover Complexes For Pervious Areas-AMC II

Cover Type (3)	Quality of Cover (2)	Soil Group A	B	C	D
AGRICULTURAL COVERS (Continued)					
Legumes, Close Seeded (Alfalfa, sweetclover, timothy, etc.)	Poor	66	77	85	89
	Good	58	72	81	85
Orchards, Evergreen (Citrus, avocados, etc.)	Poor	57	73	82	86
	Fair	44	65	77	82
	Good	33	58	72	79
Pasture, Dryland (Annual grasses)	Poor	68	79	86	89
	Fair	49	69	79	84
	Good	39	61	74	80
Pasture, Irrigated (Legumes and perennial grass)	Poor	58	74	83	87
	Fair	44	65	77	82
	Good	33	58	72	79
Row Crops (Field crops - tomatoes, sugar beets, etc.)	Poor	72	81	88	91
	Good	67	78	85	89
Small grain (Wheat, oats, barley, etc.)	Poor	65	76	84	88
	Good	63	75	83	87

Notes:

1. All curve numbers are for Antecedent Moisture Condition (AMC) II.
2. Quality of cover definitions:

   Poor-Heavily grazed, regularly burned areas, or areas of high burn potential. Less than 50 percent of the ground surface is protected by plant cover or brush and tree canopy.

   Fair-Moderate cover with 50 percent to 75 percent of the ground surface protected.

   Good-Heavy or dense cover with more than 75 percent of the ground surface protected.
3. See Figure C-2 for definition of cover types.

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

CURVE NUMBERS FOR PERVIOUS AREAS

Figure C-3 (2 of 2)

ACTUAL IMPERVIOUS COVER

Land Use (1)	Range-Percent	Recommended Value For Average Conditions-Percent (2)
Natural or Agriculture	0 - 0	0
Public Park	10 - 25	15
School	30 - 50	40
Single Family Residential: (3)		
2.5 acre lots	5 - 15	10
1 acre lots	10 - 25	20
2 dwellings/acre	20 - 40	30
3-4 dwellings/acre	30 - 50	40
5-7 dwellings/acre	35 - 55	50
8-10 dwellings/acre	50 - 70	60
More than 10 dwellings/acre	65 - 90	80
Multiple Family Residential:		
Condominiums	45 - 70	65
Apartments	65 - 90	80
Mobile Home Park	60 - 85	75
Commercial, Downtown Business or Industrial	80 - 100	90

Notes:

1. Land use should be based on ultimate development of the watershed. Long range master plans for the County and incorporated cities should be reviewed to insure reasonable land use assumptions.

2. Recommended values are based on average conditions which may not apply to a particular study area. The percentage impervious may vary greatly even on comparable sized lots due to differences in dwelling size, improvements, etc. Landscape practices should also be considered as it is common in some areas to use ornamental gravels underlain by impervious plastic materials in place of lawns and shrubs. A field investigation of a study area shall always be made, and a review of aerial photos, where available, may assist in estimating the percentage of impervious cover in developed areas.

3. For typical equestrian subdivisions increase impervious area 5 percent over the values recommended in the table above.

SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

ACTUAL IMPERVIOUS COVER
FOR
DEVELOPED AREAS

Figure C-4

C.5. ANTECEDENT MOISTURE CONDITION (AMC)

The definitions for the AMC classifications are:

AMC I: Lowest runoff potential. The watershed soils are dry enough to allow satisfactory grading or cultivation to take place.

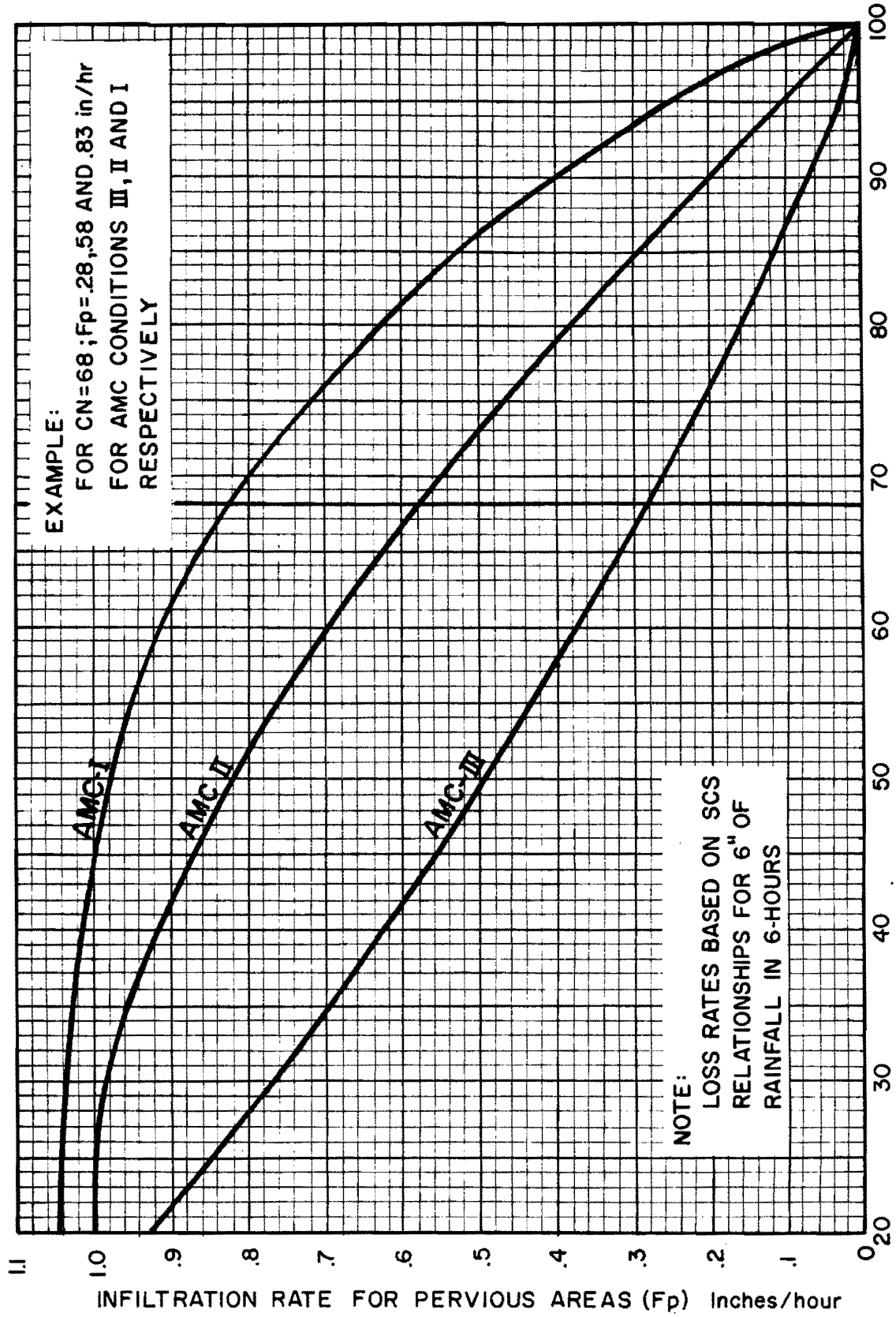
AMC II: Moderate runoff potential; an average study condition.

AMC III: Highest runoff potential. The watershed is practically saturated from antecedent rains. Heavy rainfall or light rainfall and low temperatures have occurred within the last five days.

For runoff hydrograph studies based on this manual it is assumed that a low AMC index (high loss rates) will be used in developing short return period storms, and a moderate to high AMC index (low loss rates) will be used in developing longer return period storms (e.g., 100 year). For the purposes of design hydrology, AMC I will be used for the 2- and 5-year return frequency storms. For the case of 10-, 25-, 50-year return frequency design storms, AMC II will be used. For 100-year storm analysis, AMC III shall be used. In detention basin design studies, AMC III conditions shall be considered in order to identify any downstream flooding potential.

C.5.1. Adjustment of Curve Numbers (CN) for AMC

The CN values selected for a particular soil cover type and quality also depend upon the AMC condition assumed. The CN values listed in Figure C-3 correspond to AMC II and require adjustment in order to represent either AMC I or AMC III. Table C.1 provides the necessary CN adjustments to account for AMC changes for hydrologic studies in San Bernardino County.



SAN BERNARDINO COUNTY
HYDROLOGY MANUAL

INFILTRATION RATE FOR PERVIOUS AREAS VERSUS SCS CURVE NUMBERS

Figure C-6

COUNTY OF SAN BERNARDINO DETENTION BASIN DESIGN GUIDE

DETENTION BASIN DESIGN CRITERIA FOR SAN BERNARDINO COUNTY

The following design parameters and procedures are listed as guidelines to insure proper detention basin operation. When necessary, these guidelines may be modified if approved in writing by both the Flood Control District and Land Management Department.

I. Definitions

A. Regional Detention Basin

1. A basin which can be incorporated into the Flood Control District's existing or proposed drainage system,

2. Basin owned and operated by the Flood Control District, although it may be joint use, and

3. A basin which will reduce the downstream peak flow rate and the necessary downstream storm drain size.

B. Local Detention Basin

1. A basin which will not be incorporated into the Flood Control District's existing or proposed drainage system,

2. A basin owned by an individual or organization other than the Flood Control District, and

3. A basin which will reduce the downstream peak flow rate, but will not be considered in downsizing future downstream storm drains.

C. Joint Use Detention Basin

A regional or local detention basin which has an additional use such as football field, parking lot, golf course, lake or etc.

D. Temporary Detention Basin

1. A local detention basin used to reduce downstream peak flow rates until ultimate storm drain facilities can be constructed as part of a phased development, and

2. Generally the life of the basin shall not exceed 10 years.

II. Basin Capacity and Outlet Drain

A. When a basin (regional, local, temporary or joint use) is to be used to mitigate downstream impacts due to increased flows generated by a development, the basin capacity and outlet size shall be such that the post-development peak flow rate generated by the site shall be less than or equal to 90% of the pre-development peak flow rate from the site for all frequency storms up to and including 100-year (i.e. the peak 2 year post-development flow rate is equal to or less than 90% of the peak 2 year pre-development flow rate from the site and etc. for all frequency storm events through 100-year).

1. Only 2, 10, 25 and 100-year storms need to be analyzed.

2. Additional studies shall be submitted where there exists more than one basin in the drainage area under review. The studies shall address the timing of the peak flow rates from the basins to ensure downstream flow rates are not increased.

SEE CHANGE PER ATTACHED MEMO

B. When a basin (generally regional or regional joint use) is to be used to reduce the size of a master planned downstream drainage facility, the basin capacity and outlet size shall be such that the 100 year basin peak outflow rate is no greater than the downstream facility's design capacity.

1. Open channel design capacities shall be per the San Bernardino County Flood Control District Standard Plat 100 ("San Bernradino County Standards and Specifications"). A bulking factor is not necessary when the basin is designed to handle debris and the downstream channel is lined.

2. Pressure flow closed conduits shall be designed such that the hydraulic grade line is below the ground or street surface. In those reaches where no surface flow will be intercepted (now or in the future), a hydraulic grade line which encroaches on or is slightly higher than the ground or street surface will be acceptable.

3. Non-pressure flow closed conduit capacities shall be based on a flow depth no greater than 0.8 times the conduits diameter or height.

7. The basin capacity for detention basins located in watersheds known to have a high risk of burning, shall be increased as determined by the Flood Control District.

E. Outlet Drain

1. The outlet pipe for all basins except temporary basins shall be a minimum 24" RCP (1350 D minimum) for local basins and a minimum 36" RCP (1350 D minimum) for regional basins. The outlet pipe or conduit shall be encased with cut-off collars per the "Los Angeles County Flood Control Design Manual - Debris Dams and Basins" or designed per "Section 242. Cut-and-Cover Conduit Detail" of the Bureau of Reclamation's publication "Design of Small Dams".

   a) Reinforced concrete collars generally from 2 to 3 feet high, 12 to 18 inches wide, and spaced from 7 to 10 times their height shall be provided.

   b) All joints for pipes not encased shall be rubber gasketed.

   c) The pipe shall be capable of withstanding H20 live loads plus the applicable dead loads.

   d) Erosion control measures shall be provided at the outlet of the basin outlet pipe.

   e) Temporary basin outlet pipes may be a minimum 24" C.M.P., 12 gauge with seep rings. Design considerations shall be as stated above.

2. A metered outlet structure may be necessary to provide the necessary flow attenuation for all frequency storms. "V"-shaped weirs and notched weirs are preferred over other alternates because they do not plug with debris and trash as easily as other designs.

3. All detention basin outlets should be sized so the basin will drain within 24 hours after the basin reaches its 100 year peak depth/volume. If the basin does not drain in 24 hours, further studies using longer duration storms will be necessary. The basin storage volume (capacity) may need to be increased to accomodate subsequent storms.

4. Trash racks shall be provided at the inlet to the basin outlet structure(s).

5. Anti-vortex devises shall be provided where warranted.

6. A depth gauge shall be provided on the basin outlet structure in order to monitor debris deposition and basin operation.

F. Analysis Methodology

1. Pre and post development peak flow rates shall be developed using the procedures outlined in the San Bernardino County's Hydrology Manual.

2. Basin inflow hydrographs shall be developed using the procedures outlined in the San Bernardino County's Hydrology Manual.

3. Basin outflow hydrographs shall be developed by the Modified Puls Method.

4. Channel hydrograph routing shall be calculated by the convex channel routing method or by moving the hydrograph utilizing travel time.

III. Water Surface Elevation and Depth

A. Local Basins

1. When feasible the 100 year design water surface elevation should be at or below existing natural ground. Generally no more than 50% of the basins 100 year storage depth should be above existing ground (i.e., 50% or more of the 100-year minimum storage depth must be below the lowest ground outside basin).

2. The necessary storage depth for debris plus the two year flow attenuation shall be below existing ground.

3. The basin's maximum water depth for 100-year design should be 6 feet or less.

4. When site conditions warrant and safety can be assured, the above depth requirements may be modified if the following conditions are met.

a) The detention basin is designed in accordance with the Los Angeles County Flood Control Distrit's "Design Manual - Debris Dams and Basins".

b) The basin embankment is constructed of material, or has a solid core, which does not allow seepage or piping to occur due to rodent holes.

B. Regional Basins

1. Depths shall be as approved by the Flood Control District.

2. Basins with heights greater than or equal to 25 feet and capacity greater than or equal to 15 Ac.ft., or a capacity greater than or equal to 50 ac. ft. and a height greater than or equal to 6 feet, shall be reviewed and approved by the State's Division of Safety of Dams. (See figure 2)

C. Joint Use Basins

1. Depths should be shallow and compatible with the secondary use.

2. Depths for parking lot, tennis court or other similar joint use basins should be no greater than 6 inches to 12 inches.

3. The allowable depth in most cases will be site specific and shall be approved by all agencies involved.

IV. Emergency Spillway

A. All detention basin spillways shall be designed to pass the fully developed 1000 year peak flow rate ($Q_{1000}=1.35\ Q_{100}$) or that peak flow rate required by the State's Division of Safety of Dams, whichever is greater.

B. Spillway outflows shall be adequately conveyed to a storm drain, drainage channel, street or an established watercourse.

C. Generally, all spillway structures shall be constructed of reinforced concrete. For temporary detention basins with an expected life less than 10 years the spillway may be constructed with grouted rock or other forms of approved protection designed to resist maximum design velocities.

D. When the spillway crest is more than 3 feet above the flowline of the facility the spillway outlets into, the spillway shall be constructed of reinforced concrete.

E. Generally the spillway crest shall be at, or above the basin's design 100 year high water line.

V. Freeboard to the Top of Embankment

A. Local and temporary basins shall have a minimum 1-foot of freeboard above the 1000-year HWL on the emergency spillway or 2-feet of freeboard above the 100-year HWL in the basin, whichever is more stringent.

B. Regional basins shall have a minimum 2-feet of freeboard above the 1000 year HWL on the emergency spillway. For basins with larger surface areas the freeboard shall be increased due to possible wave action. Also, a Seismic Seiche analysis shall be provided to determine necessary freeboard. Reference "Design of Small Dams" by the United States Department of Interior.

C. Joint use basins shall conform to the applicable local or regional freeboard requirements. For smaller basins such as parking lot and tennis court basins, the freeboard conditions may be reduced.

VI. Basin Embankment

A. Basin side slopes should be of 3H:1V or flatter on the wet side and 2H:1V or flatter on the dry side. Steeper slopes may be acceptable on a case by case basis if rock lined and recommended in the soils and geotechnical report. (See items C and D below for expanded requirements for report.)

B. Top Width of Levee

1. Regional and local basins - 15 feet minimum
2. Joint use - site specific
3. Refer to Section IX.C.

C. For design of the embankment abutments and adjacent slopes, a soils and geotechnical report shall be prepared by a soils and geotechnical engineer with a demonstrated expertise in earth fill dam design. The report shall be reviewed and approved by the Land Management Department and the San Bernardino County Flood Control District. The report shall include:

a) Site geology including bedding, foliation, fracture, joint, fault and land slide plane attitudes.

II. Basin Capacity and Outlet Drain

A. When a basin (regional, local, temporary or joint use) is to be used to mitigate downstream impacts due to increased flows generated by a development, the basin capacity and outlet size shall be such that the post-development peak flow rate generated by the site shall be less than or equal to 90% of the pre-development peak flow rate from the site for all frequency storms up to and including 100-year (i.e.) the peak 2 year post-development flow rate is equal to or less than 90% of the peak 2 year pre-development flow rate from the site and etc. for all frequency storm events through 100 year).

1. Only 2, 10, 25 and 100-year storms need to be analyzed.

2. Post-development peak flow rates shall be calculated in accordance with the "San Bernardino County Hydrology Manual".

3. Pre-development peak flow rates shall be calculated in accordance with the "San Bernardino County Hydrology Manual" with the following exceptions.

   a) 10-year peak flow rates shall be calculated using 5-year rainfall.

   b) 25-year peak flow rates shall be calculated using 10-year rainfall.

   c) 100-year peak flow rates shall be calculated using 25-year rainfall and AMC-II.

4. Additional studies shall be submitted where there exists more than one basin in the drainage area under review. The studies shall address the timing of the peak flow rates from the basins to ensure downstream flow rates are not increased.

APPENDIX H

HYDROLOGY MANUAL INTEROFFICE MEMO

INTEROFFICE MEMO

1853

County of San Bernardino

DATE September 4, 1987 PHONE 2515

FROM ROBERT W. CORCHERO, Chief
Water Resources Division

TO CHARLES L. LAIRD, Acting Director
Transportation/Flood Control File: 1(FC)-53

SUBJECT SAN BERNARDINO COUNTY DETENTION BASIN DESIGN CRITERIA

As requested the subject criteria was reviewed with respect to the determination of pre-development peak flow rates. According to the existing criteria the County can be 85% confident that the calculated peak flow rate will equal or exceed the peak flow rate at a given concentration point if adequate streamflow data was available. Therefore, the County can only be about 15% confident a detention basin outflow will not adversely affect downstream properties (not considering erosion).

The County should be at least 50% confident a detention basin outflow will not adversely impact properties downstream of the basin. Based on the calibration study of the county's hydrology method the input parameters (procedures) described in the Manual should be modified as follows:

a) 10 year peak flow rates should be calculated using 5-year rainfall,

b) 25-year peak flow rates should be calculated using 10-year rainfall, and

c) 100-year peak flow rates should be calculated using 25-year rainfall and AMC II.

If these design parameters are used for determining the pre-development peak flow rates, the basin outflow metered to 90% of these calculated pre-development peak flow rates and the post-development peak flow rates to the basin calculated in accordance with County Hydrology Manual, the County will be over 50% confident the resulting basin design will not adversely affect adjacent or downstream properties (not considering erosion).

The desired confidence level for detention basin outflow is a policy decision. Once the desired confidence level is determined the required input rainfall amounts can be developed to calculate the peak flow rate at the corresponding confidence level. I have discussed this policy issue with John Pederson of the U.S. Army Corps of Engineers, Ron Moore of the Soil Conservation Service and Al Nessinger of Orange County. Al Nessinger pointed out by using basin inflow hydrographs based on a 85% confidence level

and by creating adequate storage to reduce the peak flow rate from the basin to 90% of pre-development condition based on a 50% confidence level, the resulting confidence level that downstream conditions have not changed will be greater than 50%. Also, the rainfall pattern used in the hydrograph method was chosen to be the most severe test on basin design. When these facts are combined with criteria of using multi-day storms, the resulting basin design should be adequate to ensure downstream properties will not be subject to increased peak flow rates. Ron Moore felt the revised criteria better fit the actual pre-development conditions in the field. John Pederson and Al Nessigner both felt the criteria should be tested against actual occurrences in gaged watershed. Attached is page 2 of the design criteria with the proposed changes shown in bold type.

Should you have any questions, please call.

RWC:mjs
Attachment

cc: Ken Miller

APPENDIX I

INFILTRATION TESTING RESULTS

TETRA TECH

Project No. GEN 19-22E
August 11, 2022

Mr. Dan Darnell
Carson Companies
100 Bayview Circle #3500
Newport Beach, California 92660

Subject: **PERCOLATION INVESTIGATION**
PEPPER 210 COMMERCE CENTER
20080 Highland Avenue
County of San Bernardino, California

References: Fault Investigation Report, Vulcan Aggregate Pit Redevelopment Project, 20080 Highland Avenue, Rialto, California, prepared by Tetra Tech, dated February 28, 2022.

Geotechnical Data and Assessment Report, Vulcan Pit Redevelopment, Rialto, California, prepared by Tetra Tech, dated November 25, 2019.

Dear Mr. Darnell:

This report presents the results of Tetra Tech's field percolation testing performed at various locations within the subject property located at 20080 Highland Avenue, within the County of San Bernardino, California. The purpose of this investigation was to document field percolation test results and provide geotechnical parameters and recommended infiltration rates for the design and construction of both surface and below grade stormwater BMP improvements.

SITE DESCRIPTION AND HISTORY

The site comprises an area of approximately 101 acres and is located north and northwest of the intersection of Highland Avenue and N. Pepper Avenue in unincorporated San Bernardino County, California. The site is roughly triangular and is located within the western flood plain of Lytle Creek, however, it is protected from the current alignment of Lytle Creek Wash by an Army Corps of Engineers flood control levee which bounds the property to the north – northeast. The property is bounded by Highland Avenue to the south and an existing residential development and a new residential development currently under construction to the west (formerly a portion of the El Rancho Verde Country Club and golf course).

The site is currently utilized for the production and sale of construction aggregate, including sand, gravel, aggregate base, and asphalt. Plant operations initiated during the 1950's and initially included open pit mining of the westerly half of the property to depths of up to approximately 50 feet below the original ground surface. We understand that backfilling of the open pits within the property has continued periodically over the decades. A comparison of the topography of historic mining pit bottoms and the 2016 topographic expression of the site is shown on Figure 1. Further deep mining is not anticipated during the remainder of the property lease.

Overall, the site gently slopes to the southeast and drains to various detention basins within the property via graded earth swales with exception of the ponded areas within the central portion of the site.

Ascending slopes up to 58 feet in height border the southwestern perimeter of the site and generally vary from approximately 1.5(H):1(V) to 2(H):1(V) in gradient. The north and east perimeter of the site is bordered by a flood control levee with 2(H):1(V) slopes, rising about 20 feet above the adjacent grades.

PROJECT DESCRIPTION

We understand that pit reclamation grading operations will be initiated upon termination of the current aggregate operations (projected in 2025). At that time, all undocumented fill materials will be removed and replaced as engineered fill in conformance with recommendations provided in a separate geotechnical report for the site.

Based on the conceptual site plan prepared by RGA (undated), the site will be developed with a building with about 1,280,354 square feet of office and warehouse space and truck loading docks along the building perimeter. Other site improvements will include drive aisles, auto and truck parking, underground utilities, decorative flatwork, exterior lighting, and landscaping elements (see Figure 1 – Site Plan and Percolation Test Location Map).

PREVIOUS GEOTECHNICAL AND GEOLOGIC STUDIES BY TETRA TECH

In November of 2019, Tetra Tech completed a geotechnical investigation for the subject property. The purpose of that study was to evaluate the general existing fill conditions, estimate required cut / fill volumes, and provide preliminary geotechnical conclusions and considerations relative to the future site development. As part of that study, 8 exploratory borings were drilled at various locations within the property to depths ranging from about 11.5 to 51.5 feet.

During January 2021 and February 2022, Tetra Tech also completed a comprehensive fault investigation within the subject property. The fault investigation included excavation and logging of 8 exploratory trenches measuring up to about 23 feet below the ground surface and totaling approximately 4,185 lineal feet.

Pertinent subsurface information collected from these studies was utilized to assess the distribution and depths of the existing artificial fill at the site. Additionally, the borings and trenching allowed for an assessment of the soil types, engineering properties, and stratigraphic distribution of the native alluvial soils beneath the site.

FIELD PERCOLATION TESTING

To evaluate the infiltration characteristics of the near surface native alluvial soils and to determine suitable borehole locations for field percolation testing, the limits of the historical mining pit bottoms and areas underlain by more than 10 feet of artificial fill were avoided. Tetra Tech performed 7 borehole falling-head percolation tests denoted as P-1 through P-7 on June 21, 2022,

in accordance with the borehole percolation test procedure described in Appendix D of the Technical Guidance Document for Water Quality Management Plans prepared for the County of San Bernardino Areawide Stormwater Program, dated September 19, 201 (Technical Guidance document). Eight-inch diameter boreholes were drilled utilizing a hollow stem auger drill rig to depths varying from about 9.5 to 10 feet. The approximate locations of the boreholes are presented on Figure 2 – Site Plan and Percolation Test Location Map.

A 3-inch-diameter perforated PVC pipe with 5/8-inch-diameter holes was installed in the percolation borings. The casing was wrapped in a protective cloth filter sock to limit the migration of soil particles into the pipe. The pipe was surrounded by a free-draining gravel pack comprised of 3/8-inch p-gravel.

Percolation boreholes were presoaked to a depth of approximately 5 times the hole radius for at least 1 hour before the test. After the presoak period, an initial water head of approximately 1 foot was introduced above the bottom of the borehole. Percolation testing was then conducted by recording the time required for the borehole to completely empty as monitored by a stopwatch and well sounder. After each reading, the borehole was re-filled and the procedure was repeated. The process was continued until a stabilized drop rate was stabilized. After completion of the percolation testing, the PVC pipes were removed and the boreholes were backfilled with tamped soil cuttings.

The design infiltration rates of the on-site soils, expressed in inches per hour, were then calculated by applying a Factor of Safety, in accordance with Worksheet H of the San Bernardino County Technical Guidance document, to the measured field infiltration rates corrected for the porosity of the gravel. The Factors of Safety reflect:

- Suitability of underlying soils for infiltration
    - soil assessment methods
    - predominant soil texture
    - site soil variability
    - depth to groundwater/impervious layer

- The infiltration system design
    - tributary area size
    - level of pretreatment/expected sediment load
    - redundancy
    - compaction during grading

For this study, a Factor of Safety of 2 was applied to account for site suitability considerations, and a Factor of Safety of 2.5 was applied to account for the infiltration system design considerations, resulting in a combined factor of safety of 5. The calculated infiltration rates of the on-site soils are summarized in Table 1. The percolation test data sheets utilized to determine measured field infiltration rates for each borehole are attached in Appendix A of this report.

Table 1
Summary of Design Infiltration Rates

Percolation Test No.	Approximate Borehole Depth (feet)	Approximate Test Depth Intervals (feet)	Measured Infiltration Rate (inches / hour)	Design Infiltration Rate (inches / hour)
P-1	9.5	8.5 - 9.5	172.7	34.5
P-2	9.0	8.0 – 9.0	113.5	22.7
P-3	9.5	8.5 - 9.5	165.5	33.1
P-4	9.6	8.6 – 9.6	91.3	18.3
P-5	9.6	8.6 – 9.6	40.1	8.0
P-6	9.5	8.5 - 9.5	73.6	14.7
P-7	9.9	8.9 – 9.9	96.9	19.4
Recommended Design Infiltration Rate:				**8.0**

RECOMMENDED DESIGN INFILTRATION RATE AND BMP LOCATIONS

Results of percolation testing indicate that the calculated infiltration rates of the on-site native alluvial soils range from about 34.5 to 8.0 inches per hour. Based on our review of the underlying stratigraphic conditions, the lowest infiltration rate (8.0 in/hr) can likely be attributed to local/isolated sequences of finer-grained alluvial lenses identified within our past borings and exploratory trench exposures. Though the finer-grained / less permeable alluvial lenses are local deposits in comparison to the predominate sand and gravel deposits beneath the site, they occur in an unpredictable distribution and should be considered in the BMP design. Therefore, a design infiltration rate 8.0 inches per hour is recommended for the design of the stormwater BMP's with an invert elevation at approximately 9 to 10 feet below grade of the primary drive aisles within the plant.

As summarized herein, aggregate operations in the past included open pit mining of the westerly half of the property to depths of up to approximately 50 feet below the original ground surface. Areas of the site that are underlain by more than about 10 feet of artificial fill should be avoided for locating future BMP improvements to ensure infiltration within native alluvial soils. A comparison of the topography of historic mining pit bottoms and the 2016 topographic expression of the site is shown on Figure 1 and should be referenced in determining layout of BMP improvements. Future plans and construction documents for storm water BMP submittals should be reviewed by the Geotechnical Engineer to confirm compliance with this report.

LIMITATIONS

The conclusions, recommendations, and opinions expressed in this report are based on Tetra Tech's review of background documents and on information obtained from field percolation testing. Due to the limited nature of the field percolation testing, conditions not observed and

described in this report may be present on the site. Uncertainties relative to subsurface conditions can be reduced through additional subsurface exploration and testing. Additional subsurface evaluation and testing can be performed upon request.

This report presents key geotechnical issues that could impact the proposed site development. The information presented herein is intended only and preliminary planning purposes and is not intended to satisfy the requirements of a site-specific and detailed geotechnical investigation required for foundation design and permitting. As such, additional geotechnical design-level reports will be warranted for the specific site development plan.
This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Tetra Tech should be contacted if the reader requires additional information or has questions regarding the content, interpretations presented, or completeness of this document.

Tetra Tech has endeavored to perform its evaluation using the degree of care and skill ordinarily exercised under similar circumstances by reputable geotechnical professionals with experience in this area in similar soil conditions. No other warranty, either expressed or implied, is made as to the conclusions and recommendations contained in this report.

CLOSURE

We appreciate the opportunity to provide our professional services on this project. If you have any questions regarding this report or if we can be of further service, please do not hesitate to contact the undersigned.

Respectfully submitted,
Tetra Tech BAS, Inc.



Yonglang Li, PhD, GE
Senior Engineer



Patrick Keefe, CEG
Supervising Engineering Geologist



Peter Skopek, Ph.D., G.E.
Principal

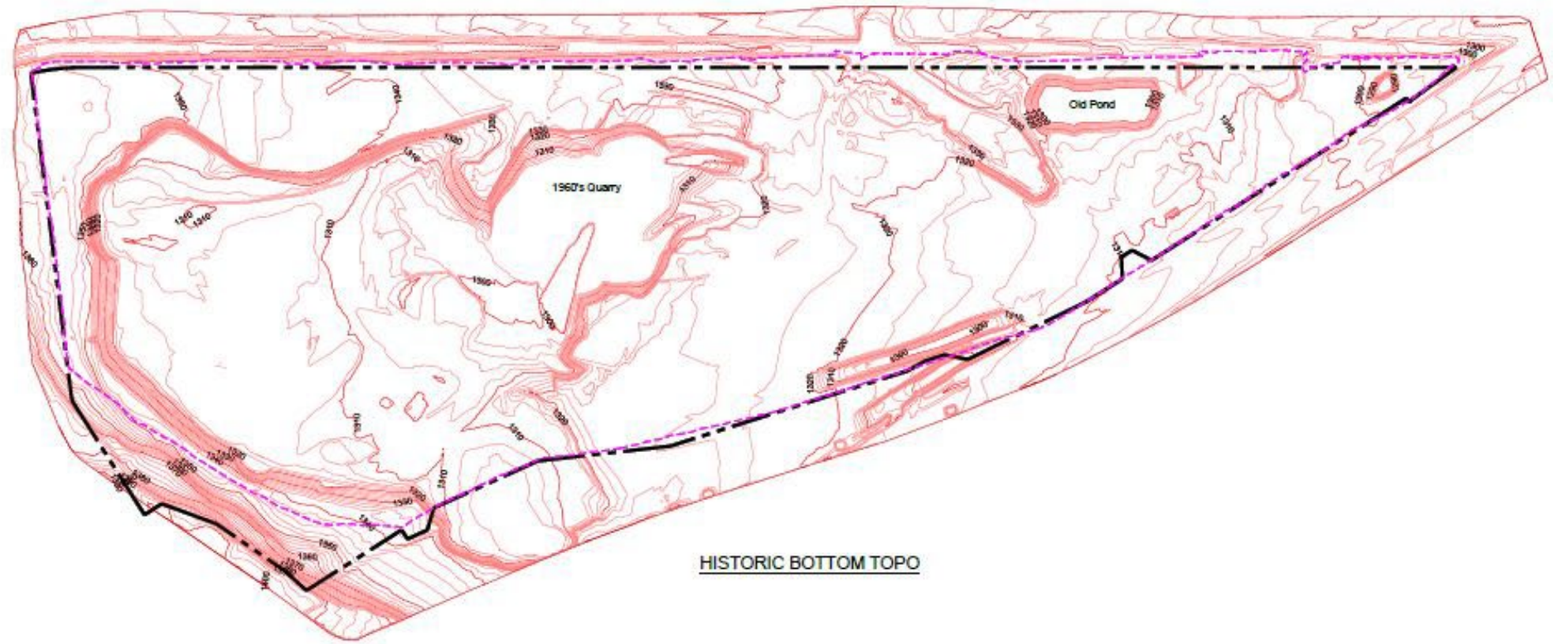
Distribution: Addressee (pdf by email DDarnell@carsoncompanies.com)

Filename: 2022-08-11 Perc Report Carson Co Rialto.docx

ATTACHMENTS

Figures 1 & 2
Appendix A – Field Percolation Test Data

FIGURES



HISTORIC BOTTOM TOPO



5/16/2016 TOPO/PHOTO

Figure 1

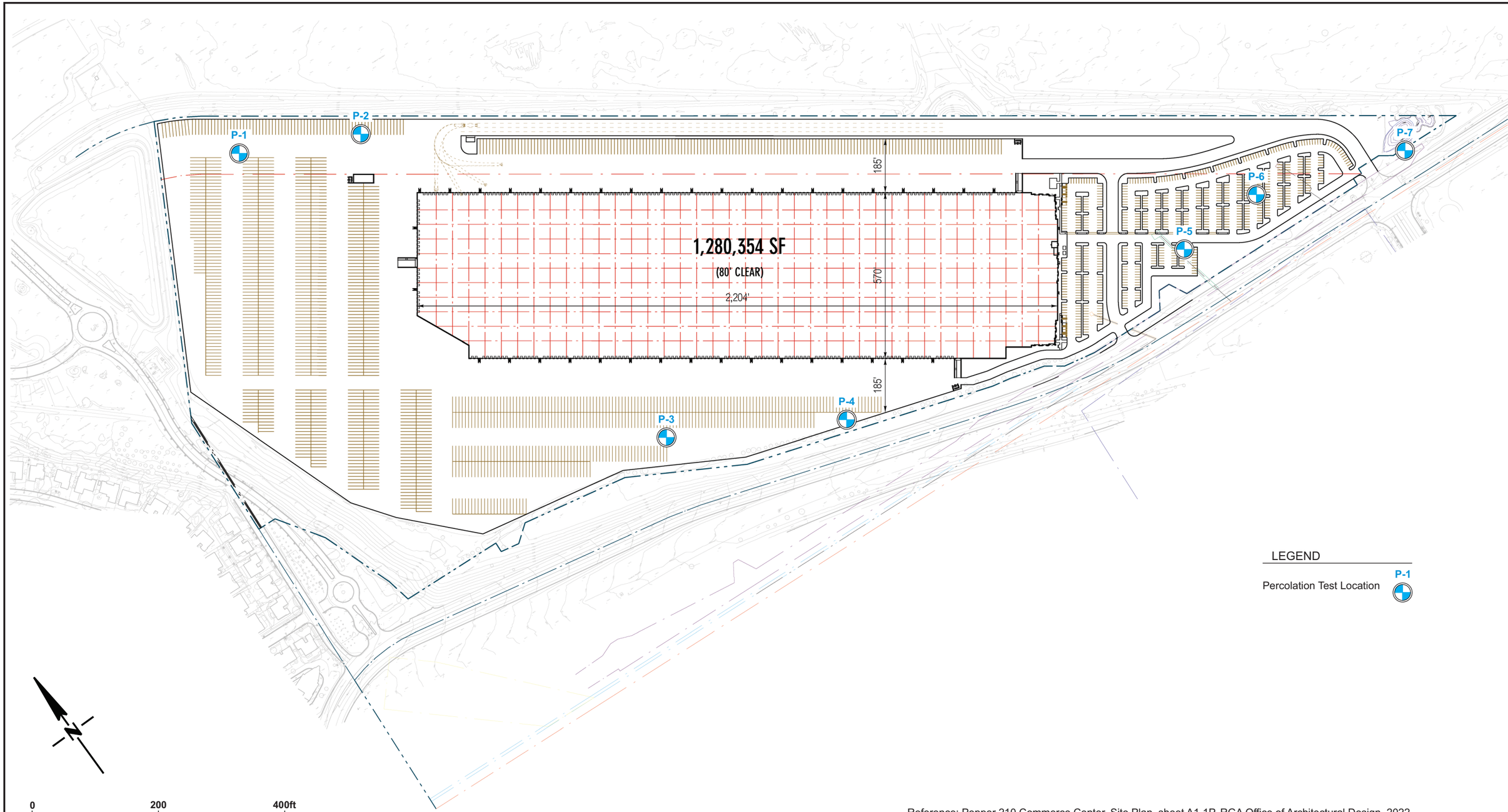
TETRA TECH
21700 Copley Drive, Suite 200, Diamond Bar, CA 91765
TEL 909.860.7777 www.tetratech.com

VULCAN GRAVEL PIT REDEVELOPMENT - RIALTO, CA

Comparison of Topography From Historic Bottom Elevations and 2016 Surface Configuration

(from Vulcan Materials Company, 2019)

JOB NO.	GEN 19-22E
DATE	AUG 2022
DRAWN BY	SCM
CHECKED BY	PMK



Reference: Pepper 210 Commerce Center, Site Plan, sheet A1-1P, RGA Office of Architectural Design, 2022.

FIGURE 2

TETRA TECH
21700 Copley Drive, Suite 200, Diamond Bar, CA 91765
TEL 909.860.7777 www.tetratech.com

VULCAN GRAVEL PIT REDEVELOPMENT - RIALTO, CA

SITE PLAN AND PERCOLATION TEST LOCATION MAP

JOB NO.	GEN 19-22E
DATE	AUG 2022
DRAWN BY	SCM
CHECKED BY	PMK

APPENDIX A

Field Percolation Test Data

TETRA TECH

PERCOLATION DATA SHEET

Project:	Pepper 210 Commerce Center, Rialto, CA		Job No:	GEN 19-22E	
Test Hole No:	**P-1**		Date Excavated:	Monday, June 20, 2022	
Test Hole Depth (feet):	9.5	feet	Soil Classification:	Gravel with Sand (GP)	
Stick up Length (feet):	0.5	feet	Gravel Porosity:	0.35	
Sandy Soil Criteria Tested By:	PMK		Presoak Date:	Monday, June 20, 2022	
Actual Percolation Tested By:	TC		Test Date:	Tuesday, June 21, 2022	
Test Hole Diameter (inches):	8	inches	Latitude:	34.142163°	Longitude: -117.364090°
Casing Diameter (inches):	3	inches	Elevation:	1351 ft	

PERCOLATION TEST (presoaking for at least 1 hour)

Time	Time Interval (min)	Initial Reading (feet below the top of the pipe)	Final Reading (feet below the top of the pipe)	Initial Water Level (feet above bottom of hole)	Final Water Level (feet above bottom of hole)	Δ in Water Level (inches)	Measured Raw Percolation Rate (inches/hour)
	0.46	9.00	10.00	1.00	0.00	12.00	172.7
	0.52	9.00	10.00	1.00	0.00	12.00	152.8
	0.43	9.00	10.00	1.00	0.00	12.00	184.8
	0.43	9.00	10.00	1.00	0.00	12.00	183.5
	0.46	9.00	10.00	1.00	0.00	12.00	172.7
	0.45	9.00	10.00	1.00	0.00	12.00	176.6
	0.45	9.00	10.00	1.00	0.00	12.00	176.6
	0.46	9.00	10.00	1.00	0.00	12.00	172.7

Suitability of underlying soils for infiltration	2.0	FACTORS OF SAFETY	Measured field infiltration rate (in/hr)= 172.7
Infiltration system design	2.5		

Technical Guidance Document for Water Quality Management Plans prepared for the County of San Bernardino Areawide Stormwater Program, dated September 19, 2013.

Corrected Design Percolation Rate = 34.5 in/hour

TETRA TECH

PERCOLATION DATA SHEET

Project:	Pepper 210 Commerce Center, Rialto, CA		Job No:	GEN 19-22E	
Test Hole No:	**P-2**		Date Excavated:	Monday, June 20, 2022	
Test Hole Depth (feet):	9.0	feet	Soil Classification:	Gravel with Sand (GP)	
Stick up Length (feet):	1.0	feet	Gravel Porosity:	0.35	
Sandy Soil Criteria Tested By:	PMK		Presoak Date:	Monday, June 20, 2022	
Actual Percolation Tested By:	TC		Test Date:	Tuesday, June 21, 2022	
Test Hole Diameter (inches):	8	inches	Latitude:	34.141692°	Longitude: -117.362794°
Casing Diameter (inches):	3	inches	Elevation:	1360 ft	

PERCOLATION TEST (presoaking for at least 1 hour)

Time	Time Interval (min)	Initial Reading (feet below the top of the pipe)	Final Reading (feet below the top of the pipe)	Initial Water Level (feet above bottom of hole)	Final Water Level (feet above bottom of hole)	Δ in Water Level (inches)	Measured Raw Percolation Rate (inches/hour)
	0.60	9.00	10.00	1.00	0.00	12.00	132.4
	0.63	9.00	10.00	1.00	0.00	12.00	126.1
	0.68	9.00	10.00	1.00	0.00	12.00	116.8
	0.65	9.00	10.00	1.00	0.00	12.00	122.2
	0.70	9.00	10.00	1.00	0.00	12.00	113.5

Suitability of underlying soils for infiltration	2.0	FACTORS OF SAFETY	Measured field infiltration rate (in/hr)= 113.5
Infiltration system design	2.5		

Technical Guidance Document for Water Quality Management Plans prepared for the County of San Bernardino Areawide Stormwater Program, dated September 19, 2013.

Corrected Design Percolation Rate = 22.7 in/hour

TETRA TECH

PERCOLATION DATA SHEET

Project:	Pepper 210 Commerce Center, Rialto, CA		Job No:	GEN 19-22E	
Test Hole No:	**P-3**		Date Excavated:	Monday, June 20, 2022	
Test Hole Depth (feet):	9.5	feet	Soil Classification:	Silty Sand and Gravel with Sand (SM/GP)	
Stick up Length (feet):	0.5	feet	Gravel Porosity:	0.35	
Sandy Soil Criteria Tested By:	PMK		Presoak Date:	Monday, June 20, 2022	
Actual Percolation Tested By:	TC		Test Date:	Tuesday, June 21, 2022	
Test Hole Diameter (inches):	8	inches	Latitude:	34.137717°	Longitude: -117.361698°
Casing Diameter (inches):	3	inches	Elevation:	1342 ft	

PERCOLATION TEST (presoaking for at least 1 hour)

Time	Time Interval (min)	Initial Reading (feet below the top of the pipe)	Final Reading (feet below the top of the pipe)	Initial Water Level (feet above bottom of hole)	Final Water Level (feet above bottom of hole)	Δ in Water Level (inches)	Measured Raw Percolation Rate (inches/hour)
	0.43	9.00	10.00	1.00	0.00	12.00	184.8
	0.47	9.00	10.00	1.00	0.00	12.00	169.0
	0.48	9.00	10.00	1.00	0.00	12.00	165.5
	0.43	9.00	10.00	1.00	0.00	12.00	184.8

Suitability of underlying soils for infiltration	2.0	FACTORS OF SAFETY	Measured field infiltration rate (in/hr)= 165.5
Infiltration system design	2.5		

Technical Guidance Document for Water Quality Management Plans prepared for the County of San Bernardino Areawide Stormwater Program, dated September 19, 2013.

Corrected Design Percolation Rate = 33.1 in/hour

TETRA TECH

PERCOLATION DATA SHEET

Project:	Pepper 210 Commerce Center, Rialto, CA		Job No:	GEN 19-22E	
Test Hole No:	**P-4**		Date Excavated:	Monday, June 20, 2022	
Test Hole Depth (feet):	9.6	feet	Soil Classification:	Silty Sand and Gravel with Sand (SM/GP)	
Stick up Length (feet):	0.4	feet	Gravel Porosity:	0.35	
Sandy Soil Criteria Tested By:	PMK		Presoak Date:	Monday, June 20, 2022	
Actual Percolation Tested By:	TC		Test Date:	Tuesday, June 21, 2022	
Test Hole Diameter (inches):	8	inches	Latitude:	34.136965°	Longitude: -117.359866°
Casing Diameter (inches):	3	inches	Elevation:	1323 ft	

PERCOLATION TEST (presoaking for at least 1 hour)

Time	Time Interval (min)	Initial Reading (feet below the top of the pipe)	Final Reading (feet below the top of the pipe)	Initial Water Level (feet above bottom of hole)	Final Water Level (feet above bottom of hole)	Δ in Water Level (inches)	Measured Raw Percolation Rate (inches/hour)
	0.72	9.00	10.00	1.00	0.00	12.00	110.4
	0.85	9.00	10.00	1.00	0.00	12.00	93.5
	0.87	9.00	10.00	1.00	0.00	12.00	91.3
	0.83	9.00	10.00	1.00	0.00	12.00	95.7

Suitability of underlying soils for infiltration	2.0	FACTORS OF SAFETY	Measured field infiltration rate (in/hr)= 91.3
Infiltration system design	2.5		

Technical Guidance Document for Water Quality Management Plans prepared for the County of San Bernardino Areawide Stormwater Program, dated September 19, 2013.

Corrected Design Percolation Rate = 18.3 in/hour

TETRA TECH

PERCOLATION DATA SHEET

Project:	Pepper 210 Commerce Center, Rialto, CA		Job No:	GEN 19-22E	
Test Hole No:	**P-5**		Date Excavated:	Monday, June 20, 2022	
Test Hole Depth (feet):	9.6	feet	Soil Classification:	Silty Sand and Gravelly Sand (SM/SP)	
Stick up Length (feet):	0.4	feet	Gravel Porosity:	0.35	
Sandy Soil Criteria Tested By:	PMK		Presoak Date:	Monday, June 20, 2022	
Actual Percolation Tested By:	TC		Test Date:	Monday, June 20, 2022	
Test Hole Diameter (inches):	8	inches	Latitude:	34.136633°	Longitude: -117.355559°
Casing Diameter (inches):	3	inches	Elevation:	1313 ft	

PERCOLATION TEST (presoaking for at least 1 hour)

Time	Time Interval (min)	Initial Reading (feet below the top of the pipe)	Final Reading (feet below the top of the pipe)	Initial Water Level (feet above bottom of hole)	Final Water Level (feet above bottom of hole)	Δ in Water Level (inches)	Measured Raw Percolation Rate (inches/hour)
	1.33	9.00	10.00	1.00	0.00	12.00	59.7
	1.53	9.00	10.00	1.00	0.00	12.00	51.9
	1.82	9.00	10.00	1.00	0.00	12.00	43.7
	1.92	9.00	10.00	1.00	0.00	12.00	41.4
	1.96	9.00	10.00	1.00	0.00	12.00	40.5
	1.92	9.00	10.00	1.00	0.00	12.00	41.4
	1.98	9.00	10.00	1.00	0.00	12.00	40.1
	1.97	9.00	10.00	1.00	0.00	12.00	40.3

Suitability of underlying soils for infiltration	2.0	FACTORS OF SAFETY	Measured field infiltration rate (in/hr)= 40.1
Infiltration system design	2.5		

Technical Guidance Document for Water Quality Management Plans prepared for the County of San Bernardino Areawide Stormwater Program, dated September 19, 2013.

Corrected Design Percolation Rate = 8.0 in/hour

TETRA TECH

PERCOLATION DATA SHEET

Project:	Pepper 210 Commerce Center, Rialto, CA		Job No:	GEN 19-22E	
Test Hole No:	**P-6**		Date Excavated:	Monday, June 20, 2022	
Test Hole Depth (feet):	9.5	feet	Soil Classification:	Silty Sand and Gravel with Sand (SM/GP)	
Stick up Length (feet):	0.5	feet	Gravel Porosity:	0.35	
Sandy Soil Criteria Tested By:	PMK		Presoak Date:	Monday, June 20, 2022	
Actual Percolation Tested By:	TC		Test Date:	Monday, June 20, 2022	
Test Hole Diameter (inches):	8	inches	Latitude:	34.136708°	Longitude: -117.354540°
Casing Diameter (inches):	3	inches	Elevation:	1308 ft	

PERCOLATION TEST (presoaking for at least 1 hour)

Time	Time Interval (min)	Initial Reading (feet below the top of the pipe)	Final Reading (feet below the top of the pipe)	Initial Water Level (feet above bottom of hole)	Final Water Level (feet above bottom of hole)	Δ in Water Level (inches)	Measured Raw Percolation Rate (inches/hour)
	0.80	9.00	10.00	1.00	0.00	12.00	99.3
	0.90	9.00	10.00	1.00	0.00	12.00	88.3
	1.02	9.00	10.00	1.00	0.00	12.00	77.9
	1.07	9.00	10.00	1.00	0.00	12.00	74.3
	1.05	9.00	10.00	1.00	0.00	12.00	75.7
	1.05	9.00	10.00	1.00	0.00	12.00	75.7
	1.08	9.00	10.00	1.00	0.00	12.00	73.6

Suitability of underlying soils for infiltration	2.0	FACTORS OF SAFETY	Measured field infiltration rate (in/hr)= 73.6
Infiltration system design	2.5		

Technical Guidance Document for Water Quality Management Plans prepared for the County of San Bernardino Areawide Stormwater Program, dated September 19, 2013.

Corrected Design Percolation Rate = 14.7 in/hour

TETRA TECH

PERCOLATION DATA SHEET

Project:	Pepper 210 Commerce Center, Rialto, CA		Job No:	GEN 19-22E	
Test Hole No:	**P-7**		Date Excavated:	Monday, June 20, 2022	
Test Hole Depth (feet):	9.9	feet	Soil Classification:	Sand and Gravel with Sand (SW/GP)	
Stick up Length (feet):	0.1	feet	Gravel Porosity:	0.35	
Sandy Soil Criteria Tested By:	PMK		Presoak Date:	Monday, June 20, 2022	
Actual Percolation Tested By:	TC		Test Date:	Monday, June 20, 2022	
Test Hole Diameter (inches):	8	inches	Latitude:	34.136319°	Longitude: -117.352829°
Casing Diameter (inches):	3	inches	Elevation:	1299 ft	

PERCOLATION TEST (presoaking for at least 1 hour)

Time	Time Interval (min)	Initial Reading (feet below the top of the pipe)	Final Reading (feet below the top of the pipe)	Initial Water Level (feet above bottom of hole)	Final Water Level (feet above bottom of hole)	Δ in Water Level (inches)	Measured Raw Percolation Rate (inches/hour)
	0.63	9.00	10.00	1.00	0.00	12.00	126.1
	0.73	9.00	10.00	1.00	0.00	12.00	108.8
	0.78	9.00	10.00	1.00	0.00	12.00	101.9
	0.82	9.00	10.00	1.00	0.00	12.00	96.9
	0.80	9.00	10.00	1.00	0.00	12.00	99.3
	0.82	9.00	10.00	1.00	0.00	12.00	96.9

Suitability of underlying soils for infiltration	2.0	FACTORS OF SAFETY	Measured field infiltration rate (in/hr)= 96.9
Infiltration system design	2.5		

Technical Guidance Document for Water Quality Management Plans prepared for the County of San Bernardino Areawide Stormwater Program, dated September 19, 2013.

Corrected Design Percolation Rate = 19.4 in/hour

APPENDIX J

EXISTING FLOOD CONTROL CULVERT CAPACITY CALCULATIONS

Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Tuesday, Aug 23 2022

Flood Control Pipe

Invert Elev Dn (ft)	=	1292.50
Pipe Length (ft)	=	43.00
Slope (%)	=	2.63
Invert Elev Up (ft)	=	1293.63
Rise (in)	=	24.0
Shape	=	Circular
Span (in)	=	24.0
No. Barrels	=	1
n-Value	=	0.024
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

Top Elevation (ft)	=	1302.02
Top Width (ft)	=	20.00
Crest Width (ft)	=	20.00

Calculations

Qmin (cfs)	=	45.00
Qmax (cfs)	=	45.00
Tailwater Elev (ft)	=	Normal

Highlighted

Qtotal (cfs)	=	45.00
Qpipe (cfs)	=	42.29
Qovertop (cfs)	=	2.71
Veloc Dn (ft/s)	=	13.46
Veloc Up (ft/s)	=	13.46
HGL Dn (ft)	=	1294.50
HGL Up (ft)	=	1299.63
Hw Elev (ft)	=	1302.15
Hw/D (ft)	=	4.26
Flow Regime	=	Inlet Control

