CEQA Drainage Study

OTAY RANCH
VILLAGE 14 and PLANNING AREAS 16/19
PROPOSED PROJECT AMENDMENT

County of San Diego, California

Preparation/Revision Date:
December 19, 2019

Prepared for:

Jackson- Pendo Development Company
2245 San Diego Avenue, Suite 223
San Diego, CA 92110

Declaration of Responsible Charge

I hereby declare that I am the engineer of work for this project, that I have exercised responsible charge over the design of the project as defined in section 6703 of the business and professions code, and that the design is consistent with current standards.

I understand that the check of project drawings and specifications by the County of San Diego is confined to a review only and does not relieve me, as engineer of work, of my responsibilities for project design.

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Alisa S. Vialpando 12/20/19
Alisa S. Vialpando, R.C.E. 47945 Date
Vice President



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CHAPTER 1 - EXECUTIVE SUMMARY

1.1 Introduction

OVERVIEW & BACKGROUND

SECTION I BACKGROUND

The Proposed Project Amendment relates to approximately 1,543 acres of undeveloped land within the 23,000-acre Otay Ranch master planned community, located in southern San Diego County. More specifically, the Proposed Project Amendment reflects proposed changes to the Approved Project, which the County Board of Supervisors approved on June 26, 2019 (the "Approved Project"). Both the Approved Project and the Proposed Project Amendment contemplate development within a portion of Otay Ranch Village 14 and Planning Areas 16/19 in the Proctor Valley area of Otay Ranch, as shown on Figure 1.

On June 27, 2019, the Owner/Applicant, entered into a Dispute Resolution Agreement with the California Department of Fish and Wildlife (CDFW), the United States Fish and Wildlife Service (USFWS), and the County of San Diego (County), pursuant to which Owner/Applicant would seek a land exchange with CDFW through a process overseen by the California Wildlife Conservation Board (WCB). The proposed land exchange, if approved by WCB, would require Owner/Applicant to (i) transfer 147.3 acres in Village 14 and 192.4 acres in Planning Areas 16 to CDFW, and (ii) record a conservation easement over 191.5 acres in Planning Area 16, and would require CDFW to transfer 219.4 acres in Village 14 to Owner/Applicant. The Proposed Project Amendment would then be implemented upon the lands within Owner/Applicant ownership, including those received via the WCB land exchange.

Because the Proposed Project Amendment assumes the above-described land exchange between Owner/Applicant and CDFW, it would result in a different development pattern than the Approved Project's development pattern. For this reason, the County will require that Owner/Applicant process a Specific Plan Amendment and a Revised Tentative Map to accommodate the Proposed Project Amendment.

The purpose of this technical analysis is to evaluate analyze the drainage impacts of the Proposed Project Amendment and mitigate as necessary.

Hunsaker & Associates prepared the following technical reports for the Final EIR which are incorporated herein by reference:

- Appendix 3.1.2-1 *CEQA Drainage Study, Otay Ranch Village 14 and Planning Areas 16/19*, Prepared by Hunsaker & Associates (February 5, 2018);
- Final EIR Appendix 3.1.2-2 *Priority Development Project (PDP) Storm Water Quality Management Plan (SWQMP Proposed Project*

Amendment), Otay Ranch Village 14 and Planning Areas 16 and 19, Prepared by Hunsaker & Associates (February 5, 2018);

- Final EIR Appendix 3.2.2-4 *Hydromodification Flow Control Study Otay Ranch Village 14 and Planning Areas 16/19 Proposed Project Amendment,* Prepared by Hunsaker & Associates (February 5, 2018);
- Final EIR Appendix 4.1-12 *CEQA Drainage Study, Otay Ranch Village 14 and Planning Areas 16/19 Land Exchange Alternative*, Prepared by Hunsaker & Associates (January 29, 2018);
- Final EIR Appendix 4.1-10 *Priority Development Project (PDP) Storm Water Quality Management Plan (SWQMP Land Exchange Alternative), Otay Ranch Village 14 and Planning Areas 16 and 19*, Prepared by Hunsaker & Associates (January 29, 2018);
- Final EIR Appendix 4.1-11 *Hydromodification Flow Control Study Otay Ranch Village 14 and Planning Areas 16/19 Land Exchange Alternative,* Prepared by Hunsaker & Associates (January 29, 2018);

Hunsaker & Associates prepared the following technical reports for the Proposed Project Amendment which are incorporated herein by reference:

- *CEQA Drainage Study, Otay Ranch Village 14 and Planning Areas 16/19 Proposed Project Amendment*, Prepared by Hunsaker & Associates (December 19, 2019);
- *Priority Development Project (PDP) Storm Water Quality Management Plan (SWQMP), Otay Ranch Village 14 and Planning Areas 16 and 19 Proposed Project Amendment*, Prepared by Hunsaker & Associates (December 2, 2019);
- *Hydromodification Flow Control Study Otay Ranch Village 14 and Planning Areas 16/19 Proposed Project Amendment,* Prepared by Hunsaker & Associates (December 2, 2019);

SECTION II PROPOSED PROJECT AMENDMENT

The Proposed Project Amendment reflects proposed changes to the approved project, which would add 147 units for a total of 1,266 residential units and would reduce the Development Footprint by approximately 230 acres, to a total of 579 acres, within a project area of 1,543 acres as shown on Figure 4 and more fully described below. The proposed project amendment includes a revised Tentative Map and Specific Plan Amendment. As contemplated in the Dispute Resolution Agreement, the Proposed Project Amendment assumes and will require a County-initiated amendment to the MSCP County Subarea Plan. Because the amendment to the MSCP County Subarea Plan will be initiated by the County, it is not part of the Proposed Project Amendment.

TERMINOLOGY

The following Terminology are used in this report.

Approved Project: The project described in Otay Ranch Village 14 and Planning Areas 16/19 Tentative Map 5616, Specific Plan 16-002, and the certified EIR, which the County of San Diego (County) approved on June 26, 2019. The Approved Project permits 1,119 residential units within a Project Area of approximately 1,369 acres. The Development Footprint of the Approved Project is 809 acres.

Development Footprint: The areas where a given project will cause permanent or temporary ground disturbance. The Development Footprint includes all on-site development, off-site improvements, and impacts resulting from infrastructure and other allowable uses within the Otay Ranch Resource Management Plan (RMP) Preserve.

EIR Land Exchange Alternative: The project alternative identified as the "Land Exchange Alternative" in Chapter 4 of the certified Final EIR. This Land Exchange Alternative contemplated a land exchange with the California Department of Fish and Wildlife (CDFW) and would develop 1,530 residential units within a Project Area of approximately 2,387.6 acres, with a Development Footprint of 658.3 acres.

Off-Site Improvements: Off-site improvements total approximately 40.1 acres and include Proctor Valley Road, wet and dry utilities, drainage facilities, trails, an off-site sewer pump station in the southern reach of Proctor Valley Road, and off-site sewer facilities to connect to the Salt Creek Interceptor as planned since 1994.

Project Area: The total land area for the Proposed Project Amendment as contemplated in the proposed land exchange between applicant and CDFW.[1] The Project Area consists of approximately 1,283.6 acres currently owned by GDCI Proctor Valley, L.P., the owner/applicant, 219.4 acres currently owned by CDFW, and approximately 40.1 acres of off-site improvements, for a total of 1,543 acres as shown in Figure 4.

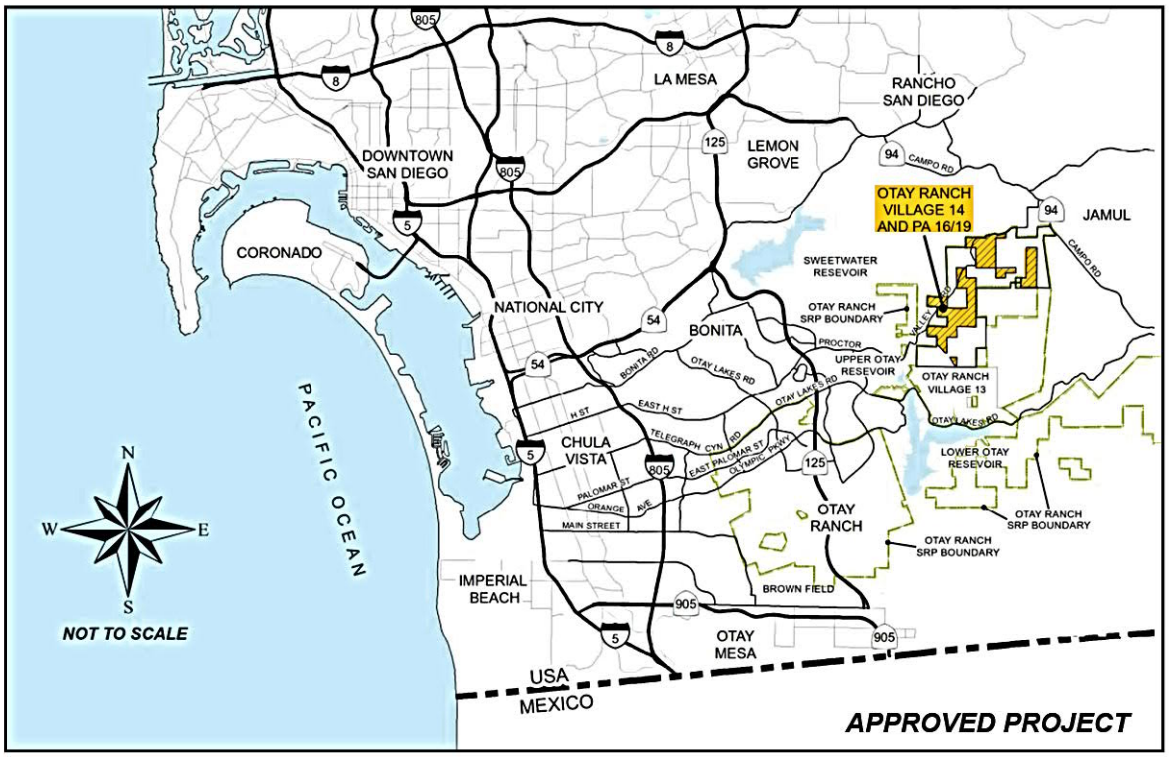
Proposed Project Amendment: The Proposed Project Amendment reflects proposed changes to the Approved Project, which would add 147 units for a total of 1,266 residential units and would reduce the Development Footprint by approximately 230 acres, to a total of 579 acres, within a Project Area of 1,543 acres, as shown on Figure 2 and in Tables 1-3.

Revised Tentative Map: The Revised Tentative Map reflects revisions to the June 26, 2019, Approved Tentative Map #5616 that are necessary to process and implement the land exchange with CDFW and the Proposed Project Amendment in the County.

[1] As indicated above, the land exchange necessary to implement the Proposed Project Amendment must be approved by the California Wildlife Conservation Board.

Specific Plan Amendment: The Specific Plan Amendment reflects revisions to the June 26, 2019, Approved Specific Plan #16-002 that are necessary to process and implement the land exchange with CDFW and the Proposed Project Amendment in the County.

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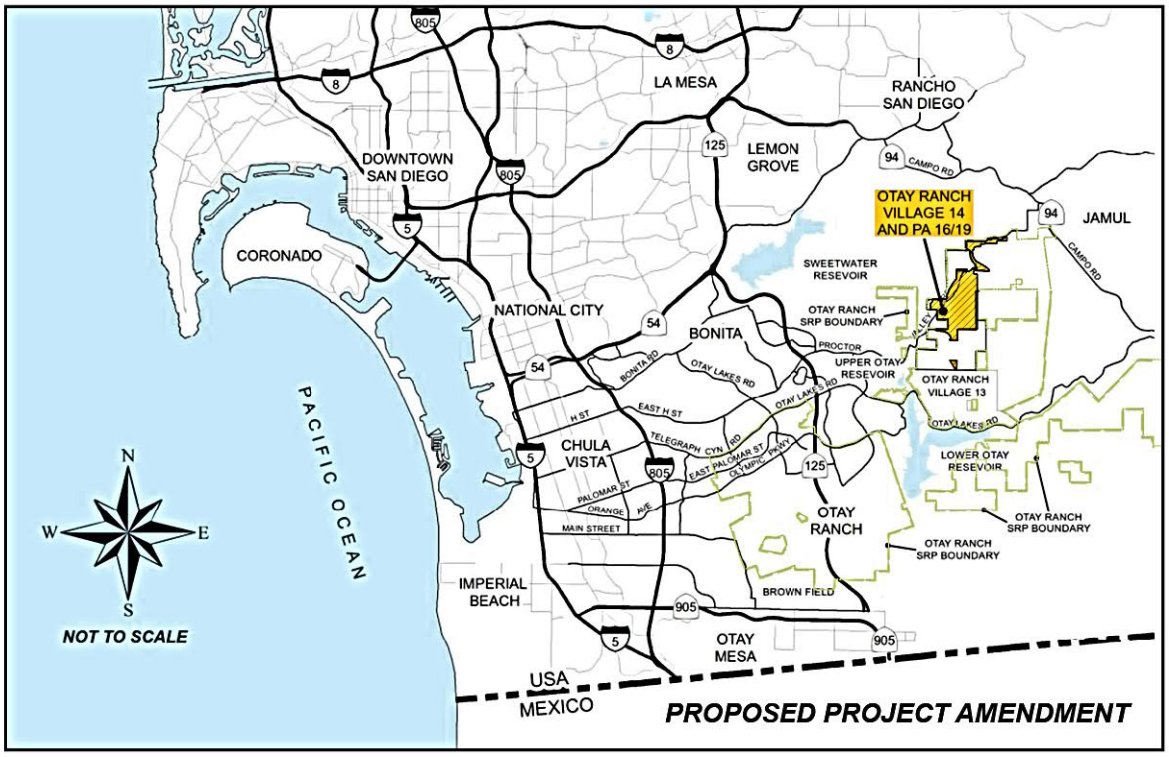


FIGURE 1
Regional Location Map

Table 1
Village 14 and Planning Areas 16/19
Proposed Project Amendment
Site Utilization Plan Summary
November, 2019

Description	Village 14		Planning Area 16/19		Total Proposed Project	
	Gross Acres	Target Units	Gross Acres	Units	Gross Acres (4)	Target Units
Residential Subtotal (1)	386.6	1,253	14.9	13	401.4	1,266
Non-Residential Uses						
Mixed Use (2)	2.7				2.7	
Public Parks	10.2				10.2	
Private Parks/Recreation (3)	9.5				9.5	
Public Safety Site	2.3				2.3	
Elementary School Site	9.9				9.9	
Open Space	47.8		1.7		49.5	
Conserved Open Space	23.0		1.5		24.5	
Otay Ranch RMP Preserve	278.6		98.4		377.0	
Circulation	23.3		3.4		26.7	
Non-Residential Uses Subtotal	407.2		105.0		512.1	-
Total Proposed Project Amendment	**793.7**	**1,253**	**119.8**	**13**	**913.6**	**1,266**
Other Offsites						
Offsite Improvements	40.1				40.1	
Offsite Preserve PA16			58.3		58.3	
Parcels Exchanged to CDFW	147.3		192.4		339.7	
Conservation Easement PA16			191.5		191.5	
Total Proposed Project Amendment Project Area					**1,543.1**	**1,266**

(1) Tota residential gross acres includes 98.6 acres of related internal slopes, fuel modification and/or preserve edge open space lots.

(2) Village 14 Mixed Use acreage includes 10,000 sf of commercial use.

(3) Village 14 has 2.1 acres of private pocket parks included in the residential acreage; therefore the subtotal including PPP is 11.6 acres.

(4) May not total due to rounding.

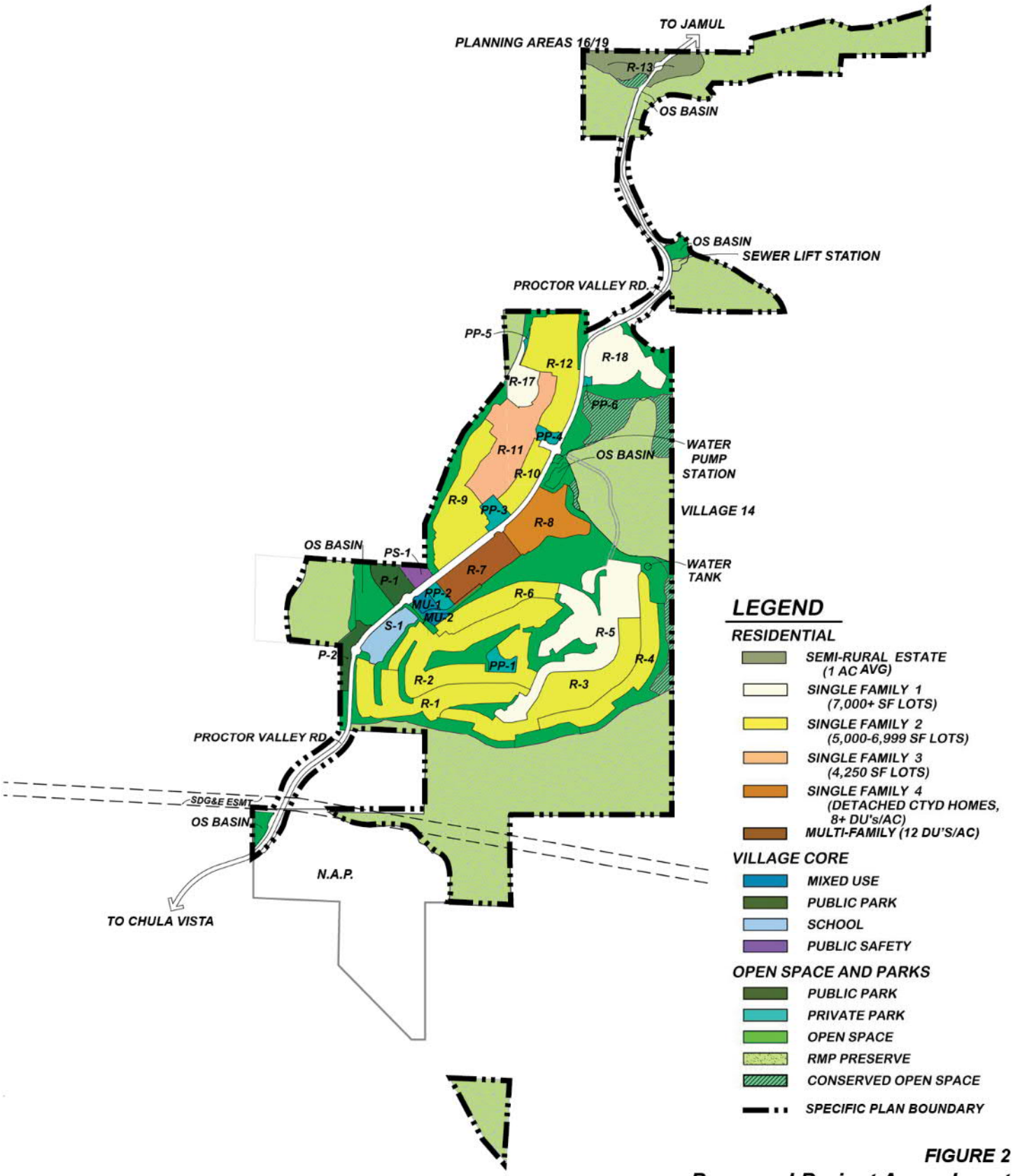


FIGURE 2

Proposed Project Amendment

Otay Ranch Village 14 and Planning Areas 16/19

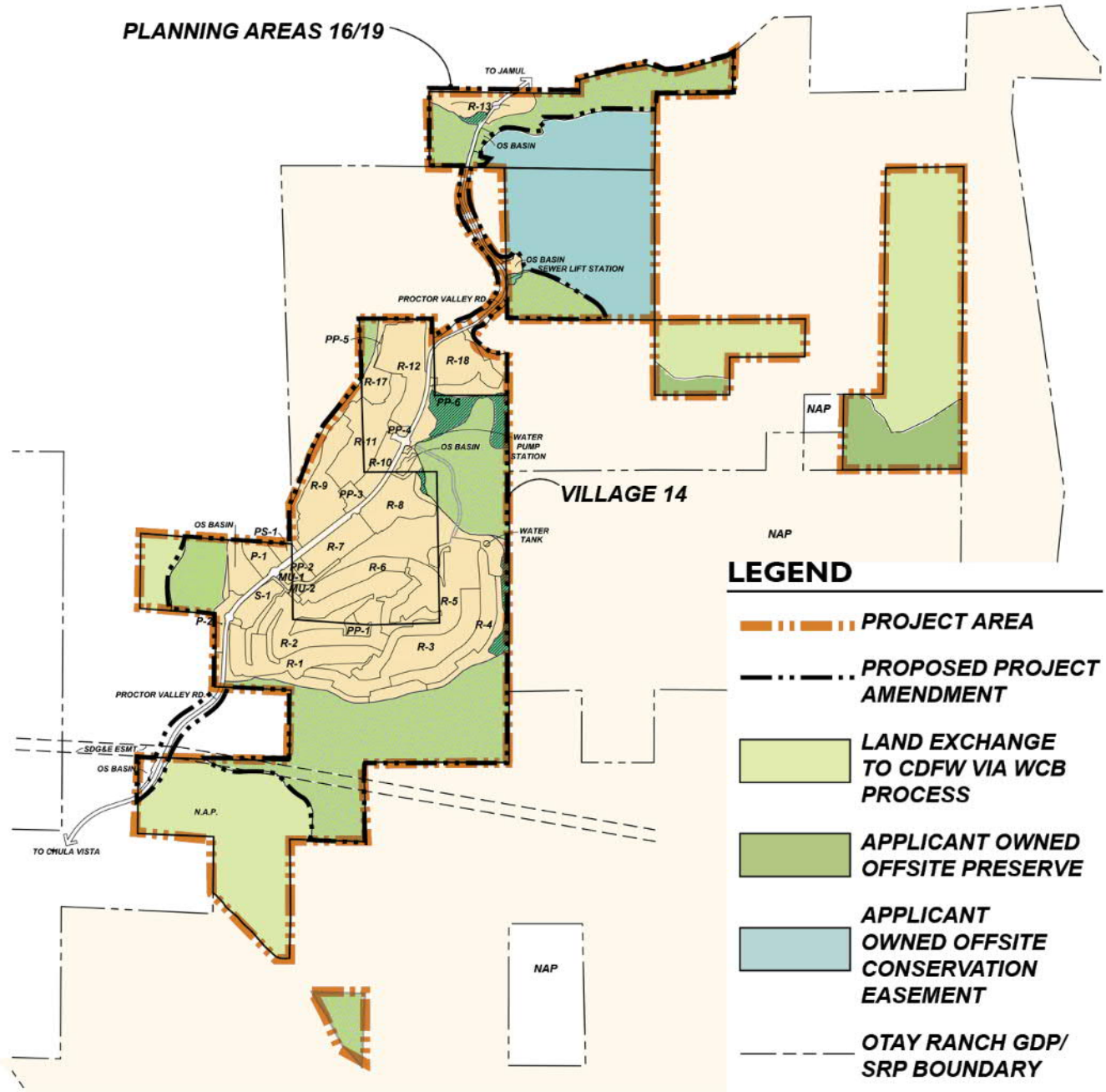


FIGURE 4

Proposed Project Amendment – Project Area

Otay Ranch Village 14 and Planning Areas 16/19

Table 2
Proposed Project Amendment
Site Utilization Plan Detail
November 1, 2019

VILLAGE 14				
Description		**Gross Acres**	**Units**	**Density**
Single Family Residential				
R-1	50*100	33.1	103	3.1
R-2	60*100	48.3	136	2.8
R-3	60*85	35.8	112	3.1
R-4	60*100	31.5	73	2.3
R-5	75*100	51.7	121	2.3
R-6	60*85	22.5	47	2.1
R-8	Courtyard M	21.1	116	5.5
R-9	60*85	33.0	96	2.9
R-10	60*85	8.5	31	3.7
R-11	50*85 M	25.4	119	4.7
R-12	50*100	27.6	94	3.4
R-17	70*100	7.4	10	1.3
R-18	70*100	27.8	45	1.6
Single Family Residential Subtotal		**373.8**	**1,103**	**3.0**
MultiFamily				
R-7	MF	12.7	150	11.8
MF Subtotal		12.7	150	11.8
Residential Subtotal [1]		**386.6**	**1,253**	**3.2**
Non-Residential Uses				
Mixed Use [2]	MU - C	2.7		
Public Parks				
P-1	Village Green Park	6.2		
P-2	Scenic Park	3.9		
Public Parks Subtotal		10.2		
Private Parks & Recreation				
PP-1	Central	2.8		
PP-2	Village Core	2.1		
PP-3	West	1.9		
PP-4	West	1.5		
PP-5	northwest	0.8		
PP-6	Northeast	0.4		
PPP *(3)*	Various	0.0		
Private Parks/Recreation Subtotal		9.5		
Public Safety Site		2.3		
Elementary School Site		9.9		
Open Space		47.8		
Conserved Open Space		23.0		
Otay Ranch RMP Preserve		274.9		
Circulation - In Preserve		3.7		
Circulation - Arterial		23.3		
Non-Residential Uses Subtotal		**407.2**		
Village 14 Subtotal		**793.7**	**1,253**	**1.6**

(1) Residential gross acres includes 96.5 acres of related internal slopes, fuel modification and/or preserve edge open space lots.

(2) Village 14 Mixed Use acreage includes 10,000 sf of commercial use.

(3) Village 14 has 2.1 acres of private pocket parks included in the residential acreage; therefore the subtotal including PPP is 11.6 acres.

(4) May not total due to rounding.

Table 3
Proposed Project Amendment
Site Utilization Plan Detail
November 1, 2019

PLANNING AREA 16/19			
Description	**Gross Acres**	**Units**	**Density**
Residential Uses			
R-13 PA 19 Estates	14.9	13	0.9
Residential Subtotal [1]	**14.9**	**13**	**0.9**
Non-Residential Uses			
Circulation in Preserve	1.4		
Open Space	1.7		
Conserved Open Space	1.5		
Otay Ranch RMP Preserve	97.0		
Circulation Arterial	3.4		
Non-Residential Uses Subtotal	**105.0**		
Planning Area 19 Subtotal	**119.8**	**13**	**0.1**
Proposed Project Amendment Total	**913.6**	**1,266**	**1.4**

OTHER			
Description	**Gross Acres**	**Units**	**Density**
Other Applicant Owned NAP of TM			
PV1 exchanged to CDFW	18.9		
PV3 exchanged to CDFW	128.4		
R-15 Exchanged to CDFW	49.9		
R-16 Exchanged to CDFW	142.5		
R-14 Conservation Easement Area	191.5		
R-15 Preserve	10.5		
R-16 Preserve	47.8		
Subtotal	**589.5**		
Offsite Acres	**40.1**		
Proposed Project Amendment Project Area	**1,543.1**	**1,266**	

Notes:

(1) Residential gross acres includes 2.1 acres of related internal slopes, fuel modification and/or preserve edge open space lots.

(2) May not total due to rounding.

PROPOSED PROJECT AMENDMENT RELATIVE TO THE APPROVED PROJECT AND THE EIR LAND EXCHANGE ALTERNATIVE.

The Final EIR evaluated both the Approved Project and the EIR Land Exchange Alternative at a project-level of analysis. This Technical Memorandum examines whether the FEIR, through its analysis of the Approved Project and the EIR Land Exchange Alternative, covered all anticipated impacts of the Proposed Project Amendment. The table below compares the Proposed Project Amendment to the Approved Project and the EIR Land Exchange Alternative. Note that from a geographical perspective, each acre that comprises the Proposed Project's Development Footprint is located either within the Approved Project Development Footprint or within the EIR Land Exchange Alternative Development Footprint. In other words, no portion of the Proposed Project Amendment Development Footprint is outside the combined Approved Project and EIR Land Exchange Alternative Development Footprints.

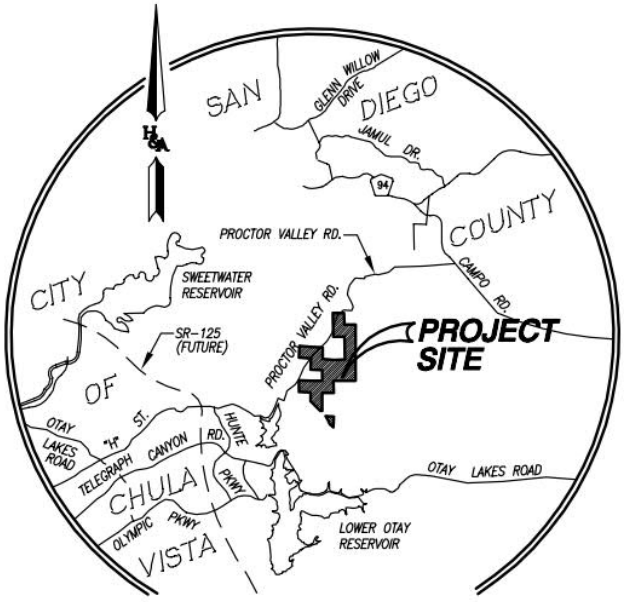
TABLE 4 Proposed Project Amendment Comparison

Description	Proposed Project Amendment	Approved Project	EIR Land Exchange Alternative
Development Footprint	579	809	658
Project Area	1,543	1,369	2,388
Offsites	40	85	40
Units	1,266	1,119	1,530
Proctor Valley Rd.	Same	Same	Same

Drainage Study Overview

All runoff from the project site currently discharges to either the Upper or Lower Otay Reservoirs via Proctor Valley and Jamul Creek. Development of the Proposed Project site will not cause any diversion to the Upper and Lower Otay Reservoir watersheds. The Upper Otay Reservoir serves as a recreational area as well as a dam with an overflow into the downstream Lower Otay Reservoir. Water from the Lower Otay Reservoir (and, thus, from the entire catchment of the reservoir) rarely discharges to the Otay River downstream of Savage Dam. Water from the Otay Reservoir is conveyed in a pipeline to the Otay Water Treatment Plant, treated to drinking water standards, and distributed as potable water to homes and businesses in the City of San Diego and neighboring communities. The only time any water is released from Otay Reservoir to the Otay River downstream is when the reservoir fills up and overflows, which has happened only seven times since 1917. The City of San Diego has stated that they will impound the maximum amount of water possible.

REGIONAL LOCATION MAP

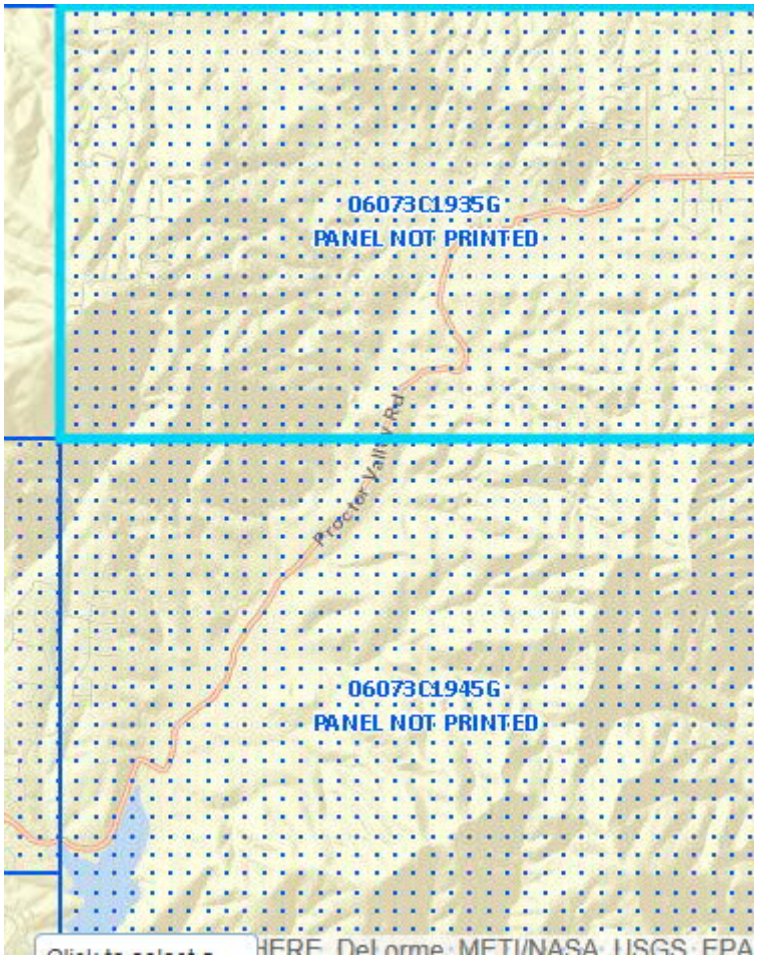


VICINITY MAP

NTS

This Otay Ranch Village 14 and Planning Areas 16/19 Drainage Study has been prepared to assess the onsite peak flow runoff rates from the Proposed Project as well as any associated offsite runoff which will be conveyed through the Proposed Project site. Additionally, this report analyzes the proposed major storm drain facilities needed to route these flows downstream without adversely impacting the downstream natural drainageways. The impact of development along and within Proctor Valley Road north and south of the proposed Village 14 development was also included with the hydrologic analysis of this study.

No previous hydrologic analyses are known to exist for the Proposed Project site. According to the FEMA Flood Map Service Center, no flood map has been printed and no historic or pending actions appear to have occurred for this area. Since the site lays outside any FEMA floodplain boundaries no Letters of Map Revision will be required.



All methodology used in this report are consistent with standards set forth by the San Diego County Hydrology Manual (SDCHM). Hydrological calculations were conducted using the Rational Method for the onsite and smaller offsite areas which were relevant in determining expected flows being conveyed through the site and which were less than 1.0 square mile in size. The larger-area hydrologic calculations (greater than 1.0 sq miles) were analyzed using Hydrologic Modeling

System (HEC-HMS) software. Per County of San Diego methodology, which is detailed in Chapter 2, all hydrologic results correspond to the 100-year design storm. The AES-2015 computer software was used to model the runoff response per the Modified Rational Method. Methodology used for the computation of design rainfall events, runoff coefficients, and rainfall intensity values are consistent with criteria set forth in the most current SDCHM. A more detailed explanation of methodology and model development used for this analysis is listed in Chapter 2 of this study. Refer to Chapters 3 ,4, and 5 for all hydrologic results. For City of San Diego review, Chapter 5.1.4 contains hydrologic analysis of the portion of the project relative to Proctor Valley Road south of Village 14.

Treatment of storm water runoff has been addressed in a separate report, titled "Priority Development Project SWQMP for Otay Ranch Village 14 & Planning Areas 16 and 19 Proposed Project Amendment" by Hunsaker & Associates dated December 2, 2019.

1.2 Summary of Pre-Developed Conditions

The existing Village 14 project site contains no development. On-site topography is characterized by steep hills, incised canyon and vegetation consisting mainly of brush. No development exists in off-site areas which drain through the Proposed Project site. Proctor Valley Road traverses the Proposed Project site connecting the community of Jamul to the City of Chula Vista. The road is partially paved through its length with minimal drainage structures. In general, the road follows the existing contours and shows evidence of runoff overtopping and sheet flowing particularly at the locations of the major existing drainage paths. Proctor Valley Road and Proctor Valley generally parallel each other. The drainage areas tributary to Proctor Valley are as shown on Exhibit 3.1 in Chapter 3. Canyon runoff east and west of Proctor Valley confluence at Proctor Valley and flow in a southwesterly direction to discharge into the Upper Otay Reservoir.

Chapter 3 includes the existing condition HEC-HMS analysis relative to the areas impacted by the Proposed Project including the improvements to Proctor Valley Road. The table below summarizes the flows calculated at various points along Proctor Valley. Please refer to Exhibit 3.1 for reference to the corresponding junction locations.

TABLE 5 - Summary of Existing Flows along Proctor Valley

Junction Name	Existing Drainage Area to Junction (acres)	100-year Existing Peak Flow (cfs)
J001	953.77	1,548
J003	2,775.71	4,934
J004	4,001.52	7,078
J005	5,372.63	9,667
J007	6,111.18	10,957
J008	6,223.71	10,992
J009	6,880.65	12,027

As shown in Table 5 above, the existing watershed to be affected by the Proposed Project is about 10.75 square miles and includes the southern portion of the City of Jamul. Due to the minimal amount of existing drainage facilities along the length of Proctor Valley Road, road drainage overtopping, sheet flows, and sediment accumulation is evident along the road length.

1.3 Summary of Developed Conditions

Development of the approximate 914-acre Proposed Project Amendment will include the construction of residential dwelling units, multiple park sites, roads, and public-use facilities such as a school site and firehouse. Roughly 444 acres of the 914-acre Project Area will be reserved for Open Space, Conserved Open Space and Otay Ranch RMP Preserve uses. Refer to Figure 2 and Table 1 above for the sites land use plan and estimated site utilization.

Proctor Valley and Proctor Valley Road (PVR) generally parallel each other with the road located along the east side of Proctor Valley through most of its length. The Proposed Project Amendment and its associated improvements to Proctor Valley Road will not significantly alter the existing Proctor Valley Road alignment. Development within Village 14 will essentially straddle Proctor Valley Road on its eastern and western sides. In general, development elevations east of PVR increase as the distance from PVR increases until the open space and MSCP Preserve areas are reached. These open space and MSCP Preserve areas continue to climb in elevation up to the watershed ridgeline. For the developed areas west of PVR, the western boundary of the developed areas defines the onsite ridgeline for drainage towards PVR.

The location of Village 14 and its associated roads along Proctor Valley is such that it intersects the offsite MSCP Preserve area's natural drainage path towards Proctor Valley. Therefore, a storm drain and drainage facilities will be required to collect and convey this offsite runoff through the Project Area. The proposed onsite storm drain system will collect development runoff and discharge into a proposed Best Management Practices (BMP) biofiltration basins intended for water quality and hydromodification treatment. Since routing the offsite MSCP Preserve area flows through any of the proposed basins would significantly increase their size and be detrimental to their long term performance, dual storm drain configurations are proposed throughout the Proposed Project Amendment wherever feasible to avoid comingling of onsite and offsite flows.

All runoff from the Proposed Project Amendment site will drain to either the Upper or Lower Otay Reservoirs. The runoff from the 85th percentile storm, as defined by the SDCHM, and drier weather runoff from developed areas of the Proposed Project Amendment will be routed to water quality basins. The riser outlet structure for each basin will be designed to address water quality and hydromodification for its respective subarea watershed and drainage management area (DMA). The performance of the BMP biofiltration basins is described in depth in the "Priority Development Project SWQMP for Otay Ranch Village 14 & Planning Areas 16 and 19 Proposed Project Amendment" by Hunsaker & Associates dated December 2, 2019. Peak flows from each basin will outlet via its respective riser top and

1.4 Analysis and Results

1.4.1 Hydrology

Table 7 summarizes the overall effect of the proposed development which discharges to Proctor Valley and subsequently into the Upper Otay Reservoir. As expected, the total post-development area equals the total pre-development area since there are not any diversions from the area upstream of the Upper Otay Reservoir.

TABLE 7 - Summary of Pre and Post-Developed Condition Flows to Upper Otay Reservoir as impacted by Proctor Valley Village 14

Condition	Tributary Area (acres)	100-Year Peak Flow (cfs)
Pre-Developed	6,880.65	12,027
Post-Developed	6,880.65	11,501
DIFFERENCE	**0**	**-526**

The Upper Otay Reservoir discharges into the Lower Otay Reservoir which is used as a water source and rarely discharges to the Otay River downstream of the Savage Dam. Water from the reservoir is conveyed in a pipeline to the Otay Water Treatment Plant, treated to drinking standards, and distributed as potable water to homes and businesses in the City of San Diego and neighboring communities. The City of San Diego has stated that they will impound the maximum amount of water as possible and oppose any reductions in the volume of runoff into the Lower Otay Reservoir. The City of San Diego has additionally specified that the quality of storm water runoff discharging into the reservoir and the Source Protection Guidelines for New Development used to address water quality matters is acceptable. The BMP measures proposed for development of the Proposed Project site will consist of biofiltration basin facilities and proprietary compact biofiltration units which will treat development flows prior to discharging into Proctor Valley or Jamul Creek and will address pollutant concerns in accordance with San Diego County BMP Design Manual. Since the capacity of the Upper Otay Reservoir is more than sufficient to convey the proposed peak flow increases and all proposed upstream storm drain will be sized to convey the projected 100-year peak flow, no detention basins are required as part of the Proposed Project. The City of San Diego provided input on and reviewed this report and the SWQMP. Based on this coordinated effort, the assumptions and results presented herein are in conformance with the City of San Diego requirements for drainage above the Otay Lakes Reservoirs.

1.4.2 Additional Culvert Considerations

Table 8 provides a summary of the proposed major conveyance storm drain facilities. The estimates below were determined using the flow results from the hydrologic analysis consisting of both the rational method and unit hydrograph included in Chapters 4 and 5. The sizes were then estimated using relevant

hydraulic software such as River Analysis System (HEC-RAS) or Hydraflow (Civil3D extension).

TABLE 8 - Summary of Proposed 100-year peak flows and Conveyance (HEC-HMS Map)

Crossing ID #	Discharge Location	100- Year Developed Peak Flow (cfs)	(Est.) Proposed Stormwater Conveyance Size
J001	Along PVR north of Basin10	1,536 cfs	3- 4' x 10' RCBC
J002	Along PVR south of Basin 8	1,466 cfs	8.25' x 22' arch culvert
J006	Along PVR, Proctor Valley tributary between Basin 1 and Basin 2	1,515 cfs	12' x 34' arch culvert
J007 (POC2)	Along PVR north of Basin 3	807 cfs	2-4'x12' RCBC
J008	Along PVR south of Basin 3	10,431 cfs	Bridge- 18' height, triple span, 2:1 Abutment on both sides
PVR3 (POC5)	Southern end of PVR	1,425 cfs	3-6'x6' RCBC
	Onsite Storm Drains	vary	18"-72"

Table 8 estimates that the onsite storm drain system will consist of pipe with diameters ranging between 18" to 72". The two major crossings along Proctor Valley are J001 and J008. Crossings carrying tributary flows towards Proctor Valley are J002, J006, J007, and PVR3. All other storm drains which convey offsite flows across onsite roads and through the site are considered as minor crossings and were not list in here. Crossings J006, and J008 will also serve as wildlife crossings. The preliminary sizing of these two wildlife crossings are based on conversations with environmental consultants and coordinated with reputable nationwide pipe and culvert suppliers. Refer to the Hydrology Maps in Chapter 5 for locations of each crossing described above.

All headwall locations will be designed with a minimum of 1 ft of freeboard for the 100-year peak flow.

1.4.3 Open Channel Inundation Summary

Table 9 shows the resulting open channel flow depths at five various node locations along Proctor Valley for the proposed post-development condition. Unit hydrograph flow rates were used since tributary areas were determined to be greater than 640 acres. The locations of the five nodes are indicated on Exhibit 3.1 (Proposed Condition HEC-HMS Hydrology Map). Chapter 6 includes the HEC RAS calculation results which determined the flow depths below. The proposed areas subject to inundation by the 100-year flood have been included on the proposed condition maps for both the Unit Hydrograph and Rational Methods.

TABLE 9 - Summary of Flow Depths for Proctor Valley

Junction Location	Channel Slope (%)	Q100 (cfs)	Flow Depth (ft)
J001	5.4	1,536	1.86
J003	0.02	4,861	5.94
J006	0.06	8,994	3.01
J007	0.18	10,474	2.39
J008	0.02	10,431	11.58

The results shown on the proposed condition hydrology maps and summarized in the table above indicate that Q100 flow depths within Proctor Valley will not surpass or overtop the finish grades from the proposed streets or development pads. No housing is proposed within the areas subject to the 100-year flood. The drainage structures described in Section 1.4.2 and Table 9 above are proposed along the drainage path to avoid impedance of peak flow runoff through Proctor Valley and its tributaries. Encroachment of the proposed 100 year inundated flood areas from the major natural areas, as shown on project hydrology maps, will be limited to crossing under and/or through streets via storm drain pipes and/or culverts. Where natural areas flow towards, and potentially along, the exterior perimeter slopes of the residential development, said slopes shall be protected as necessary to mimimize erosion and ensure long term stability. Further design analysis at the respective street crossing locations will need to be performed during the final engineering phase and may require soil stabilization measures.

1.5 Hydromodification Considerations

For hydromodification analysis refer to *""*"Priority Development Project SWQMP for Village 14 & Planning Areas 16 and 19 Proposed Project Amendment*",* Hunsaker & Associates, San Diego, December 2, 2019.

1.6 Conclusions and Recommendations

- Based on the unit hydrograph hydrologic calculations, the Proposed Project Amendment will decrease the Post-Development 100-year peak flow by about 526 cfs from 12,027 cfs to 11,501 cfs. The decrease in peak flows is as results of both basin attenuation and the peaks from the natural and developed areas not coinciding due to their different time of concentration. The lower manning's 'n' value and shorter travel distance of proposed reaches and ground surfaces in development areas (PVR05, PVR06c, PVR09), in comparison to pre-project condition, causes the peak flow from the developed areas to arrive and confluence much earlier at each junction than natural conditions.

- Post-development discharges into Proctor Valley will require energy dissipation at discharge locations to reduce velocities below erosive limits. Mitigation measures include installation of concrete energy dissipating headwalls, rip rap, and rip rap impact basins.

- The proposed water quality and hydromodification measures will reduce the overall potential for erosion as a consequence of the Proposed Project Amendment and a decrease in peak flow. A detailed explanation is presented in the "Priority Development Project SWQMP for Village 14 & Planning Areas 16 and 19 Proposed Project Amendment". It is expected that the Proposed Project Amendment will help reduce the sediment deposition in Upper Otay Reservoir as long as the proposed erosion and sediment control measures are taken during construction.

- The Proposed Project Amendment will be designed to comply with all water quality standards and waste discharge requirements in accordance with County of San Diego BMP Design Manual. Storm water treatment design is further discussed in the "Priority Development Project SWQMP for Village 14 & Planning Areas 16 and 19 Proposed Project Amendment".

- Development of the Proposed Project Amendment site will not degrade potential beneficial uses of downstream water bodies as designated by the Regional Water Quality Control Board, including water bodies listed on the Clean Water Act Section 303(d) list.

- Minor alterations to the existing drainage pattern, required as part of the Proposed Project Amendment, will be mitigated to prevent substantial erosion or siltation onsite and offsite. Energy dissipater systems will also be designed at all proposed culvert outfalls.

- Development of the Proposed Project Amendment site will not encroach on any areas subject to inundation by the 100-year flood or in 100-year flood hazard areas as defined by FEMA. As such, no Conditional Letters of Map Revisions (CLOMR) from FEMA are required.

- Prior to recordation of a final map, 100-year flood lines will be established for any lot encumbered by a drainage channel conveying a watershed area in excess of 100 acres. Any such boundary shall be clearly delineated on the non-title information sheet of the final map.

- On-site and off-site drainage easements shall be provided to the satisfaction of the Director of the County of San Diego Department of Public Works.

- A flowage easement shall be granted to the San Diego County Flood Control District if any lots are subject to inundation by the 100-year flood from a drainage area in excess of one square mile and not being conveyed to the Preserve Owner/Manager (POM).

- A copy of this study and the “Priority Development Project SWQMP for Village 14 & Planning Areas 16 and 19 Proposed Project Amendment” will be submitted to the City of San Diego for review.

1.7 References

Reference ““Priority Development Project SWQMP for Village 14 & Planning Areas 16 and 19 Proposed Project Amendment*”,* Hunsaker & Associates, San Diego, December 2, 2019.

County of San Diego BMP Design Manual, January 2019.

Order No. R9-2007-0001, NPDES No. CAS0108758 – Waste Discharge Requirements for Discharges of Urban Runoff from the Municipal Separate Storm Sewer Systems (MS4s) Draining the Watersheds of the County of San Diego, the Incorporated Cities of San Diego County, San Diego Unified Port District and the San Diego County Regional Airport Authority”, California Regional Water Quality Control Board – San Diego Region; January 24, 2007.

San Diego County Hydrology Manual; County of San Diego Department of Public Works Flood Control Division, June 2003.

Julien, P., Simons, D. “Sediment Transport Capacity of Overland Flow”. May-June 1985, Vol. 28(3). American Society of Agricultural Engineers 0001-2351 / 85 / 2803-0755

Brown and Caldwell, *“Final Hydromodification Management Plan”*, March 2011. Prepared for County of San Diego

Federal Emergency Management Agency, “Flood Insurance Study; San Diego County, California and Incorporated Areas”, Revised September 29, 2006.

CHAPTER 2

METHODOLOGY – RATIONAL METHOD PEAK FLOWRATE DETERMINATION (ULTIMATE CONDITIONS)

2.1 – Design Rainfall Determination

CHAPTER 2

METHODOLOGY – RATIONAL METHOD PEAK FLOWRATE DETERMINATION (ULTIMATE CONDITIONS)

2.1 – 100-Year, 6-Hour Rainfall Isopluvial Map

County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 6 Hours

Isopluvial (inches)

P6 = 3.1 inches

Village 14 Site Location

Orange County

Riverside County

Imperial County

Mexico

Pacific Ocean

OCEANSIDE
VISTA
CARLSBAD
ESCONDIDO
ENCINITAS
SOLANA BEACH
DEL MAR
POWAY
S.D. COUNTY
SANTEE
SAN DIEGO
EL CAJON
LA MESA
LEMON GROVE
CORONADO
SD
CHULA VISTA
IMPERIAL BEACH

117°30' 117°15' 117°00' 116°45' 116°30' 116°15'
33°30' 33°15' 33°00' 32°45' 32°30'

DPW GIS
Department of Public Works
Geographic Information Services

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CHAPTER 2

METHODOLOGY – RATIONAL METHOD PEAK FLOWRATE DETERMINATION (ULTIMATE CONDITIONS)

2.1 – 100-Year, 24-Hour Rainfall Isopluvial Map

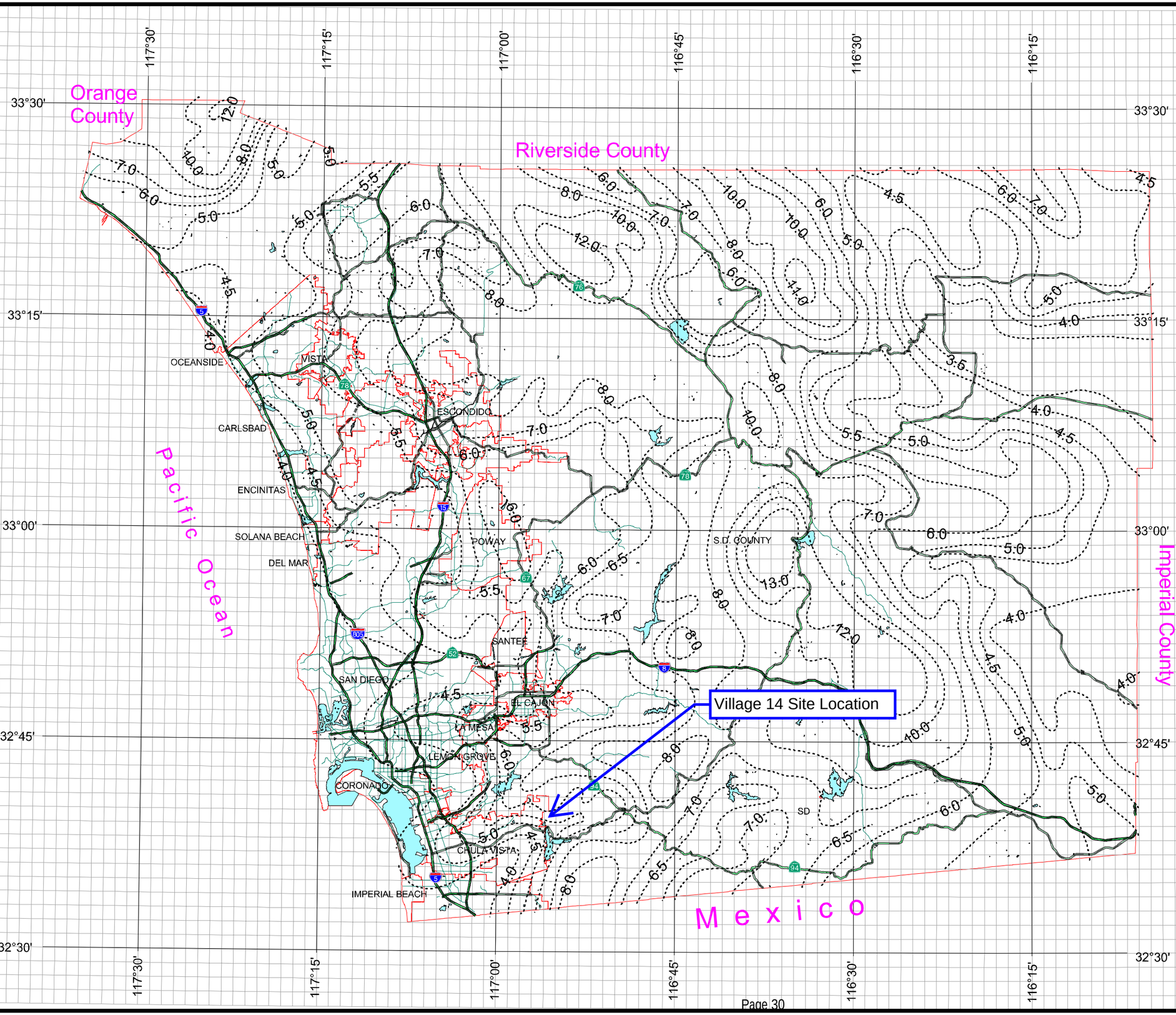
County of San Diego Hydrology Manual

Rainfall Isopluvials

100 Year Rainfall Event - 24 Hours

Isopluvial (inches)

P24 = 6.0 inches



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3 0 3 Miles

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CHAPTER 2

METHODOLOGY – RATIONAL METHOD PEAK FLOWRATE DETERMINATION (ULTIMATE CONDITIONS)

2.2 – Runoff Coefficient Determination

Table 3-1
RUNOFF COEFFICIENTS FOR URBAN AREAS

Land Use		Runoff Coefficient "C"				
			Soil Type			
NRCS Elements	County Elements	% IMPER.	A	B	C	D
Undisturbed Natural Terrain (Natural)	Permanent Open Space	0*	0.20	0.25	0.30	0.35
Low Density Residential (LDR)	Residential, 1.0 DU/A or less	10	0.27	0.32	0.36	0.41
Low Density Residential (LDR)	Residential, 2.0 DU/A or less	20	0.34	0.38	0.42	0.46
Low Density Residential (LDR)	Residential, 2.9 DU/A or less	25	0.38	0.41	0.45	0.49
Medium Density Residential (MDR)	Residential, 4.3 DU/A or less	30	0.41	0.45	0.48	0.52
Medium Density Residential (MDR)	Residential, 7.3 DU/A or less	40	0.48	0.51	0.54	0.57
Medium Density Residential (MDR)	Residential, 10.9 DU/A or less	45	0.52	0.54	0.57	0.60
Medium Density Residential (MDR)	Residential, 14.5 DU/A or less	50	0.55	0.58	0.60	0.63
High Density Residential (HDR)	Residential, 24.0 DU/A or less	65	0.66	0.67	0.69	0.71
High Density Residential (HDR)	Residential, 43.0 DU/A or less	80	0.76	0.77	0.78	0.79
Commercial/Industrial (N. Com)	Neighborhood Commercial	80	0.76	0.77	0.78	0.79
Commercial/Industrial (G. Com)	General Commercial	85	0.80	0.80	0.81	0.82
Commercial/Industrial (O.P. Com)	Office Professional/Commercial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (Limited I.)	Limited Industrial	90	0.83	0.84	0.84	0.85
Commercial/Industrial (General I.)	General Industrial	95	0.87	0.87	0.87	0.87

*The values associated with 0% impervious may be used for direct calculation of the runoff coefficient as described in Section 3.1.2 (representing the pervious runoff coefficient, Cp, for the soil type), or for areas that will remain undisturbed in perpetuity. Justification must be given that the area will remain natural forever (e.g., the area is located in Cleveland National Forest).
DU/A = dwelling units per acre
NRCS = National Resources Conservation Service

Otay Ranch Village 14 and Planning Areas 16/19

Composite C Factor Worksheet

Blue cells designate user inputs

Engineer of Record: Alisa Vialpando, P.E.

Project Manager: Johnny Rivera, P.E.

Project Engineer: Ryan Rost

WO#2421-0036

DLN 1235

DMA 1

	R-11 South (DMA 1.1)	R-10 (DMA 1.2)	R-9 (DMA 1.3)	R-7 & 8 (DMA 1.4)	R-6 (DMA 1.5)	R-5 South (DMA 1.6)	P-1 Park (DMA 1.7)	PP-1 through 3 (DMA 1.8)	R-2 (DMA 1.9)	PS-1 (DMA 1.10)	MU-1 & 2 (DMA 1.11)	R-1 (DMA 1.12)	PVRd & Misc Rd (DMA 1.13)	Misc Slopes (DMA 1.14)	Basin (DMA 1.15)	Total DMA 1
Total Area DMA(ac)=	18.421	7.781	22.791	28.744	10.994	22.986	6.988	6.233	46.438	2.531	2.650	2.403	12.079	31.526	4.080	226.643
Total Road Area(ac)=	4.987	2.111	6.354		2.887	5.428			9.561			0.555	12.079			43.963
Roadway % Impervious=	81%	81%	81%		81%	81%			81%			81%	81%			
Total Road Impervious Area (a	4.040	1.710	5.147		2.339	4.397			7.745			0.450	9.784			35.610
Total Road Pervious Area (ac)=	0.948	0.401	1.207		0.549	1.031			1.817			0.105	2.295			8.353
Total (Typical) Pad Area=	8.879	3.629	11.240	28.744	5.503	12.052	6.988	6.233	18.733	2.531	2.650	1.607				108.788
Typical Pad Area Per Lot (ac)=	0.098	0.117	0.117	28.744	0.117	0.172	6.988	6.233	0.138	2.531	2.650	0.115				N/A
Typical (min) Product Width (ft)=	50	60	60	MF	60	75	Park	Park	60	PS	MF	50				N/A
Typical (min) Product Depth (ft)=	85	85	85	MF	85	100	Park	Park	100	PS	MF	100				N/A
Typical Pad Impervious Area Per Lot (sf)=	3020	3736	3736	1064262	3736	5215	Park	Park	4387	93727	98111	3532				N/A
Typical Pad Impervious Area Per Lot (ac)=	0.069	0.086	0.086	24.432	0.086	0.120	n/a	n/a	0.101	2.152	2.252	0.081				N/A
Typical Pad Pervious Area Per Lot (ac)=	0.028	0.031	0.031	4.312	0.031	0.052	n/a	n/a	0.037	0.380	0.397	0.034				N/A
Typical (min) Pad Impervious %=	71%	73%	73%	85%	73%	70%	30%	65%	73%	85%	85%	71%				N/A
# Lots in Neighborhood=	91	31	96	1	47	70	1	1	136	1	1	14				N/A
Total Typical Pad Impervious Area (ac)=	6.309	2.659	8.234	24.432	4.031	8.380	2.096	4.051	13.697	2.152	2.252	1.135				79.429
al Typical Pad Pervious Area (a	2.570	0.971	3.006	4.312	1.472	3.672	4.891	2.182	5.036	0.380	0.397	0.472				29.360
Slope/Landscape/Pervious Area (ac)=	4.555	2.040	5.197		2.604	5.506			18.144			0.24		31.526		69.813
Total Impervious Area (ac)=	10.349	4.369	13.381	24.432	6.370	12.777	2.096	4.051	21.441	2.152	2.252	1.585	9.784	0.000	0.000	115.038
Total Pervious Area (ac)=	8.072	3.412	9.411	4.312	4.624	10.209	4.891	2.182	24.996	0.380	0.397	0.818	2.295	31.526	4.080	111.605
Composite % Impervious=	56%	56%	59%	85%	58%	56%	30%	65%	46%	85%	85%	66%	81%	0%	0%	50.8%
															222.564	51.7%
Interpolated C from Table 3-1	0.67	0.67	0.68	0.82	0.68	0.67	0.52	0.71	0.60	0.82	0.82	0.71	0.80	0.35		
Final C adopted in AES	0.67	0.67	0.68	0.71	0.68	0.70	0.52	0.52	0.60	0.52	0.75	0.70	0.85	0.35		

Final C in each sub-DMA is estimated based on %Imp and may vary to the interpolated C due to the engineering consideration.

DMA 2

	Proctor Valley Road 68' R/W (DMA 2.1)	R-1 (DMA 2.2)	R-3 (DMA 2.3)	R-4 (DMA 2.4)	PPP-1 PARK (DMA 2.5)	R-5 SOUTH (DMA 2.6)	S-1 SCHOOL (DMA 2.7)	P-2 PARK (DMA 2.8)	Basin BF-1-2 (DMA 2.9)	Additional Slopes (DMA 2.10)						TOTAL
Total Area DMA(ac)=	7.648	21.719	31.638	15.215	0.285	4.333	7.002	2.365	1.900	11.732						103.837
Total Road Area(ac)=	7.648	7.181	5.511	4.509		1.305										26.153
Roadway % Impervious=	77%	81%	81%	81%		81%										
Total Road Impervious Area (ac)=	5.889	5.816	4.464	3.652		1.057										20.878
Total Road Pervious Area (ac)=	1.759	1.364	1.047	0.857		0.248										5.275
Total (Typical) Pad Area=		10.331	13.113	10.055		2.410	7.002	2.365								45.276
Typical Pad Area Per Lot (ac)=		0.115	0.117	0.138		0.172										N/A
Typical (min) Product Width (ft)=		50	60	60		75										N/A
Typical (min) Product Depth (ft)=		100	85	100		100										N/A
Typical Pad Impervious Area Per Lot (sf)=		3532	3736	4387		5215										N/A
Typical Pad Impervious Area Per Lot (ac)=		0.081	0.086	0.101		0.120										N/A
Typical Pad Pervious Area Per Lot (ac)=		0.034	0.031	0.037		0.052										N/A
Typical (min) Pad Impervious %=		71%	73%	73%	30%	70%	85%	30%								N/A
# Lots in Neighborhood=		90	112	73	1	14	1	1								N/A
Total Typical Pad Impervious Area (ac)=		7.298	9.606	7.352	0.086	1.676	5.952	0.709								32.678
Total Typical Pad Pervious Area (ac)=		3.033	3.507	2.703	0.200	0.734	1.050	1.655								12.883
Slope/Landscape/Pervious Area (ac)=		4.21	13.01	0.65		0.62			1.900	11.732						32.123
Total Impervious Area (ac)=	5.889	13.114	14.070	11.004	0.086	2.733	5.952	0.709		0.000						53.557
Total Pervious Area (ac)=	1.759	8.606	17.568	4.211	0.200	1.600	1.050	1.655	1.900	11.732						50.281
Composite % Impervious=	77%	60%	44%	72%	30%	63%	85%	30%	0%	0%						51.6%
															101.937	52.5%

Interpolated C from Table 3-1	0.77	0.68	0.60	0.75	0.52	0.70	0.82	0.52	0.35	0.35
Final C adopted in AES	0.85	0.65	0.62	0.62	0.52	0.70	0.82	0.71	0.35	0.35

Final C in each sub-DMA is estimated based on %Imp and may vary to the interpolated C due to the engineering consideration.

DMA 6

	R-5 North (DMA 6.1)	R-4 North (DMA 6.2)	PP-4 (DMA 6.3)	PVRd & Misc Rd (DMA 6.4)	R-11 North (DMA 6.5)	R-12 (DMA 6.6)	R-17 (DMA 6.7)	R-18 (DMA 6.8)	Water Tank (DMA 6.9)	Misc Slope (DMA 6.10)	Basin BF-1-6 (DMA 6.11)					
Total Area DMA(ac)=	13.664	2.973	0.879	5.950	6.856	23.219	2.933	17.355	0.823	9.217	1.511					85.380
Total Road Area(ac)=	3.459	1.054		5.950	1.887	5.625	0.700	4.380	0.823							23.878
Roadway % Impervious=	81%	81%		81%	81%	81%	81%	81%	100%							
Total Road Impervious Area (ac)=	2.802	0.854		4.820	1.528	4.556	0.567	3.548	0.823							19.498
Total Road Pervious Area (ac)=	0.657	0.200		1.131	0.358	1.069	0.133	0.832	0.000							4.380
Total (Typical) Pad Area=	6.371	1.377	0.879		2.829	10.790	1.607	7.231								31.085
Typical Pad Area Per Lot (ac)=	0.172	0.138	0.879		0.098	0.115	0.161	0.161								N/A
Typical (min) Product Width (ft)=	75	60	PARK		50	50	70	70								N/A
Typical (min) Product Depth (ft)=	100	100	PARK		85	100	100	100								N/A
Typical Pad Impervious Area Per Lot (sf)=	5215	4387			3020	3531	5215	5215								N/A
Typical Pad Impervious Area Per Lot (ac)=	0.120	0.101	0.572		0.069	0.081	0.120	0.120								N/A
Typical Pad Pervious Area Per Lot (ac)=	0.052	0.037	0.308		0.028	0.034	0.041	0.041								N/A
Typical (min) Pad Impervious %=	70%	73%	65%		71%	71%	74%	74%								N/A
# Lots in Neighborhood=	37	10	1		29	94	10	45								N/A
Total Typical Pad Impervious Area (ac)=	4.429	1.007	0.572		2.011	7.620	1.197	5.387								22.223
Total Typical Pad Pervious Area (ac)=	1.941	0.370	0.308		0.819	3.170	0.410	1.844								8.862
Slope/Landscape/Pervious Area (ac)=	3.835	0.541			2.139	6.804	0.626	5.743		9.217						28.905
Total Impervious Area (ac)=	7.231	1.861	0.572	4.820	3.539	12.176	1.764	8.935	0.823	0.000	0.000					41.721
Total Pervious Area (ac)=	6.433	1.112	0.308	1.131	3.317	11.042	1.169	8.420	0.000	9.217	1.511					43.659
Composite % Impervious=	53%	63%	65%	81%	52%	52%	60%	51%	100%	0%	0%					48.9%
															83.869	49.7%

Interpolated C from Table 3-1	0.65	0.70	0.71	0.80	0.65	0.65	0.68	0.63	0.95	0.35	0.35
Final C adopted in AES	0.65	0.65	0.52	0.85	0.65	0.65	0.67	0.67	0.95	0.35	0.35

Final C in each sub-DMA is estimated based on %Imp and may vary to the interpolated C due to the engineering consideration.

DMA 10

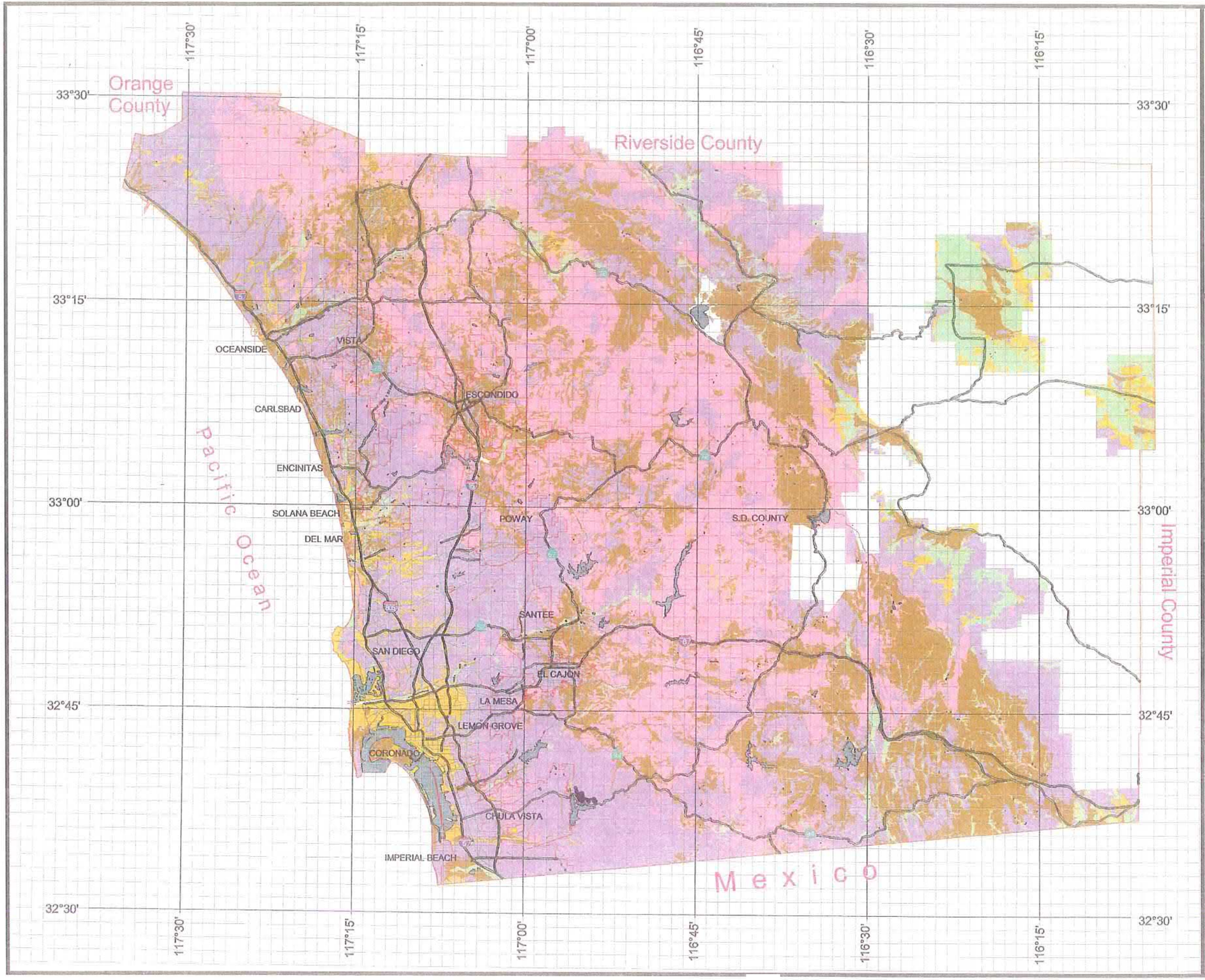
	Proctor Valley Road 68' R/W (DMA 10.1)	R-13 (DMA 10.2)	Basin BF-1-10 (DMA 10.3)	Slopes DMA 10.4												TOTAL
Total Area DMA(ac)=	0.807	10.909	0.230	0.707												12.652
Total Road Area(ac)=	0.807	1.376														2.182
Roadway % Impervious=	77%	91%														
Total Road Impervious Area (ac)=	0.621	1.252														1.873
Total Road Pervious Area (ac)=	0.186	0.124														0.309
Total (Typical) Pad Area=		9.533														9.533
Typical Pad Impervious Area Per Lot (sf)=		6000														N/A
Typical Pad Impervious Area Per Lot (ac)=		0.138														N/A
# Lots in Neighborhood=		13														N/A
Total Typical Pad Impervious Area (ac)=		1.791														1.791
Slope/Landscape/Pervious Area (ac)=		7.742		0.707												8.449
Total Impervious Area (ac)=	0.621	3.043	0.000													3.664
Total Pervious Area (ac)=	0.186	7.866	0.230	0.707												8.988
Composite % Impervious=	77%	28%	0%	0%												29.0%
															12.422	29.5%

Interpolated C from Table 3-1	0.77	0.51	0.35	0.35
Final C adopted in AES	0.79	0.52	0.35	0.35

Final C in each sub-DMA is estimated based on %Imp and may vary to the interpolated C due to the engineering consideration.

County of San Diego Hydrology Manual

Soil Hydrologic Groups



Legend

Soil Groups

- Group A
- Group B
- Group C
- Group D
- Undetermined
- Data Unavailable

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Hydrologic Soil Group—San Diego County Area, California
(VILLAGE 14 HYDROLOGIC SOIL GROUPS)

CHAPTER 2

METHODOLOGY – RATIONAL METHOD PEAK FLOWRATE DETERMINATION (ULTIMATE CONDITIONS)

2.3 – Peak Intensity Determination

-Maximum Overland Flow Length & Initial Time of Concentration

-Natural Watershed Overland Time of flow Nomograph

-Urban Watershed Overland Time of Flow Nomograph

Gutter & Roadway Discharge-Velocity Chart

-Manning's Equation Nomograph

Note that the Initial Time of Concentration should be reflective of the general land-use at the upstream end of a drainage basin. A single lot with an area of two or less acres does not have a significant effect where the drainage basin area is 20 to 600 acres.

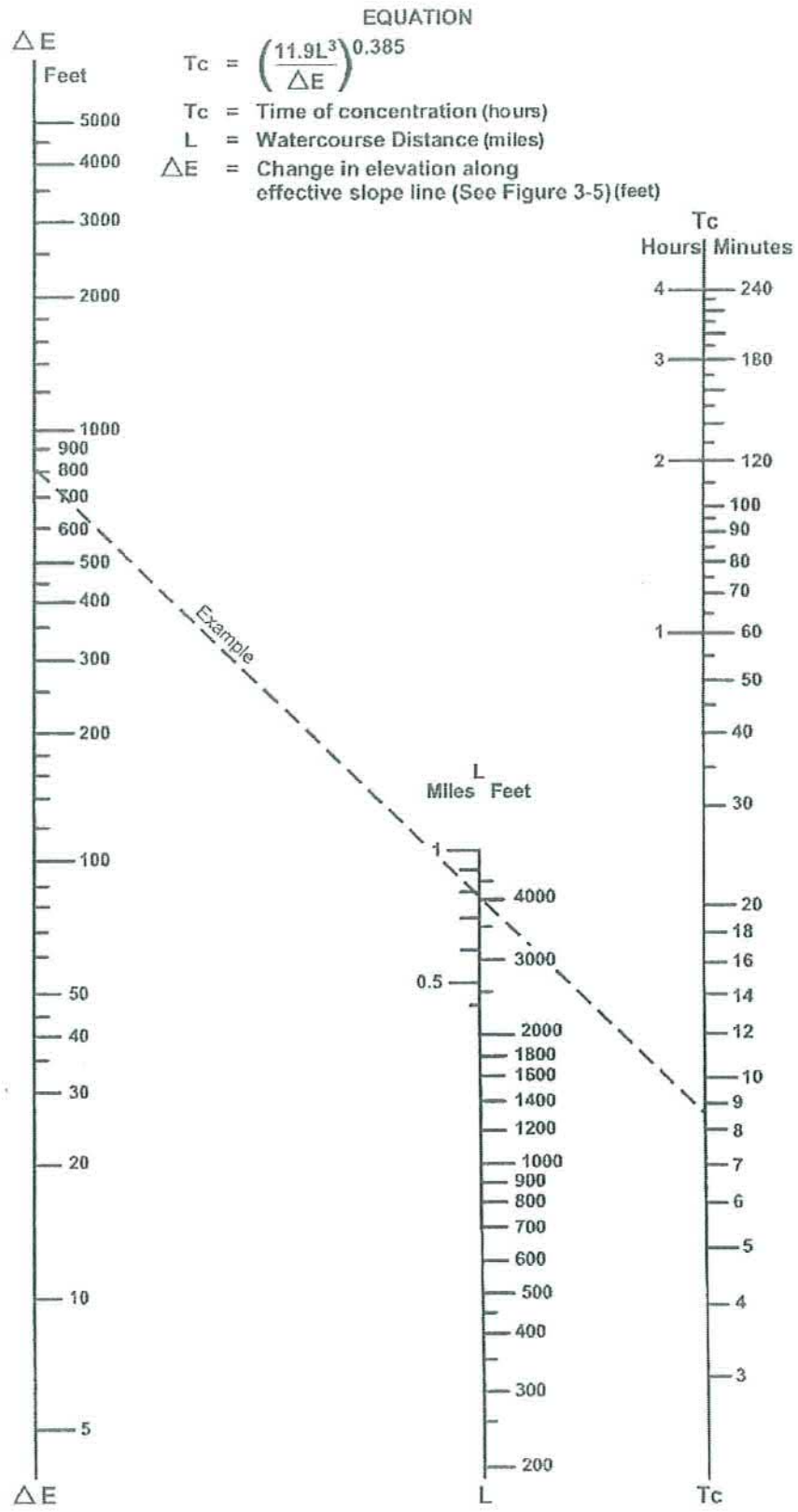
Table 3-2 provides limits of the length (Maximum Length (L_M)) of sheet flow to be used in hydrology studies. Initial T_i values based on average C values for the Land Use Element are also included. These values can be used in planning and design applications as described below. Exceptions may be approved by the "Regulating Agency" when submitted with a detailed study.

Table 3-2

MAXIMUM OVERLAND FLOW LENGTH (L_M)
& INITIAL TIME OF CONCENTRATION (T_i)

Element*	DU/ Acre	.5%		1%		2%		3%		5%		10%	
		L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i	L_M	T_i
Natural		50	13.2	70	12.5	85	10.9	100	10.3	100	8.7	100	6.9
LDR	1	50	12.2	70	11.5	85	10.0	100	9.5	100	8.0	100	6.4
LDR	2	50	11.3	70	10.5	85	9.2	100	8.8	100	7.4	100	5.8
LDR	2.9	50	10.7	70	10.0	85	8.8	95	8.1	100	7.0	100	5.6
MDR	4.3	50	10.2	70	9.6	80	8.1	95	7.8	100	6.7	100	5.3
MDR	7.3	50	9.2	65	8.4	80	7.4	95	7.0	100	6.0	100	4.8
MDR	10.9	50	8.7	65	7.9	80	6.9	90	6.4	100	5.7	100	4.5
MDR	14.5	50	8.2	65	7.4	80	6.5	90	6.0	100	5.4	100	4.3
HDR	24	50	6.7	65	6.1	75	5.1	90	4.9	95	4.3	100	3.5
HDR	43	50	5.3	65	4.7	75	4.0	85	3.8	95	3.4	100	2.7
N. Com		50	5.3	60	4.5	75	4.0	85	3.8	95	3.4	100	2.7
G. Com		50	4.7	60	4.1	75	3.6	85	3.4	90	2.9	100	2.4
O.P./Com		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
Limited I.		50	4.2	60	3.7	70	3.1	80	2.9	90	2.6	100	2.2
General I.		50	3.7	60	3.2	70	2.7	80	2.6	90	2.3	100	1.9

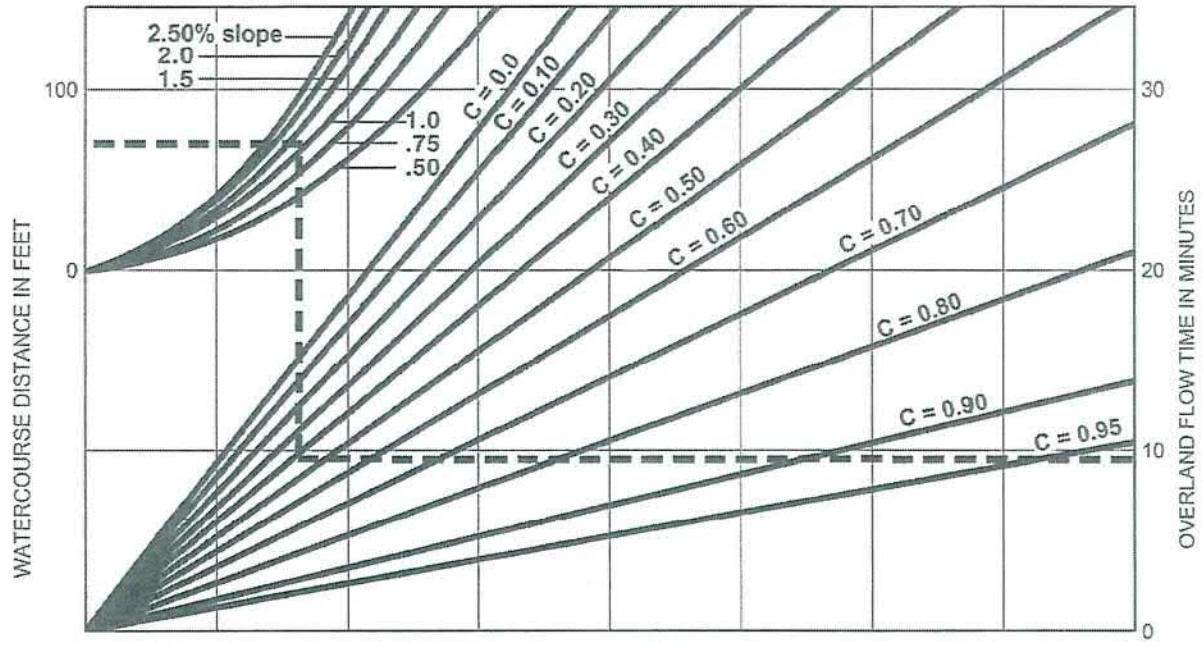
*See Table 3-1 for more detailed description



SOURCE: California Division of Highways (1941) and Kirpich (1940)

FIGURE 3-4

Nomograph for Determination of
Time of Concentration (Tc) or Travel Time (Tt) for Natural Watersheds



EXAMPLE:
Given: Watercourse Distance (D) = 70 Feet
Slope (s) = 1.3%
Runoff Coefficient (C) = 0.41
Overland Flow Time (T) = 9.5 Minutes

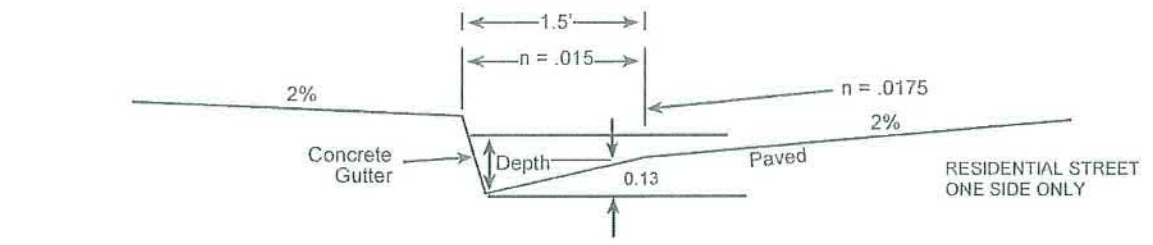
$$T = \frac{1.8\,(1.1-C)\sqrt{D}}{\sqrt[3]{s}}$$

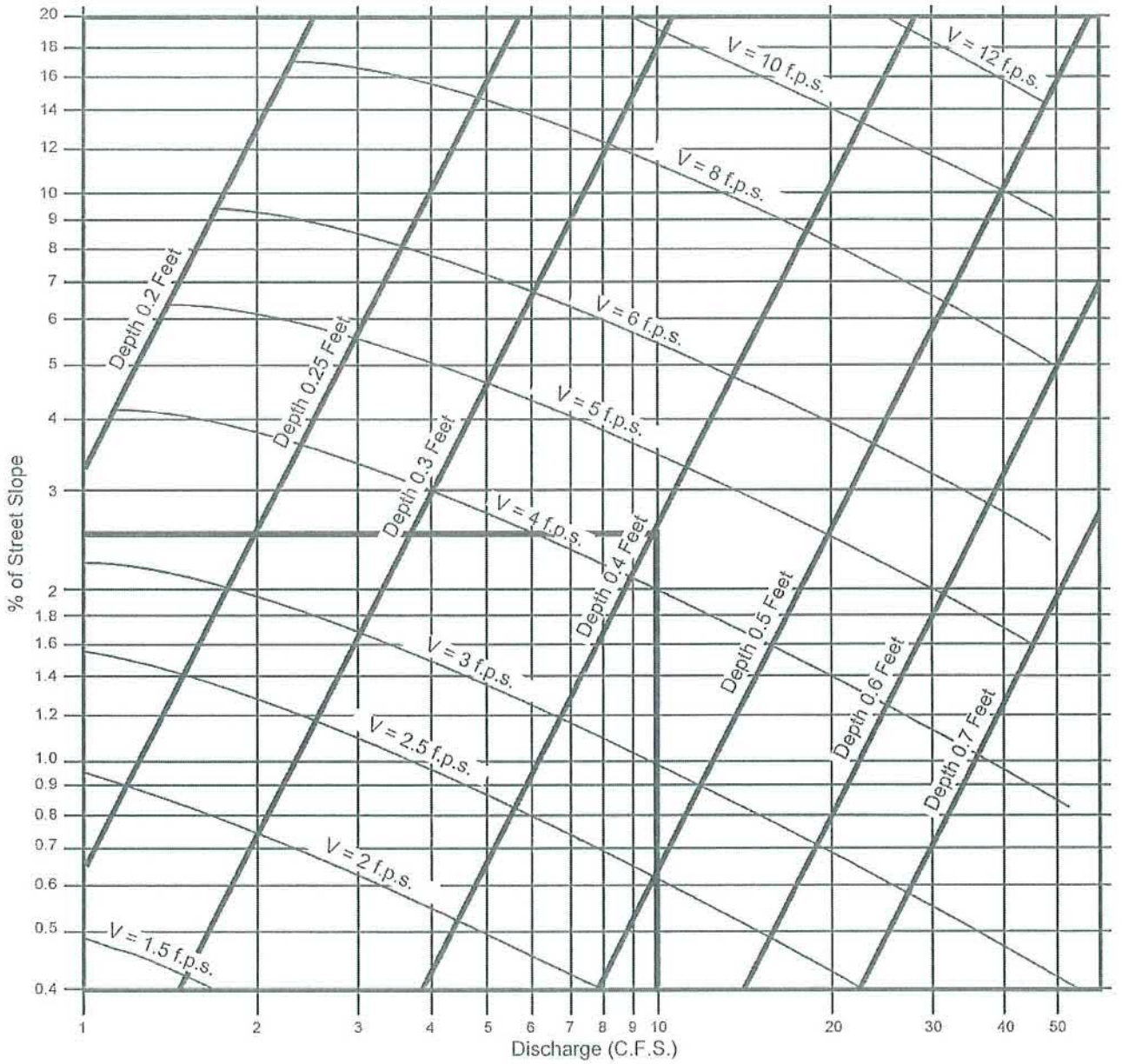
SOURCE: Airport Drainage, Federal Aviation Administration, 1965

FIGURE

Rational Formula - Overland Time of Flow Nomograph

3-3



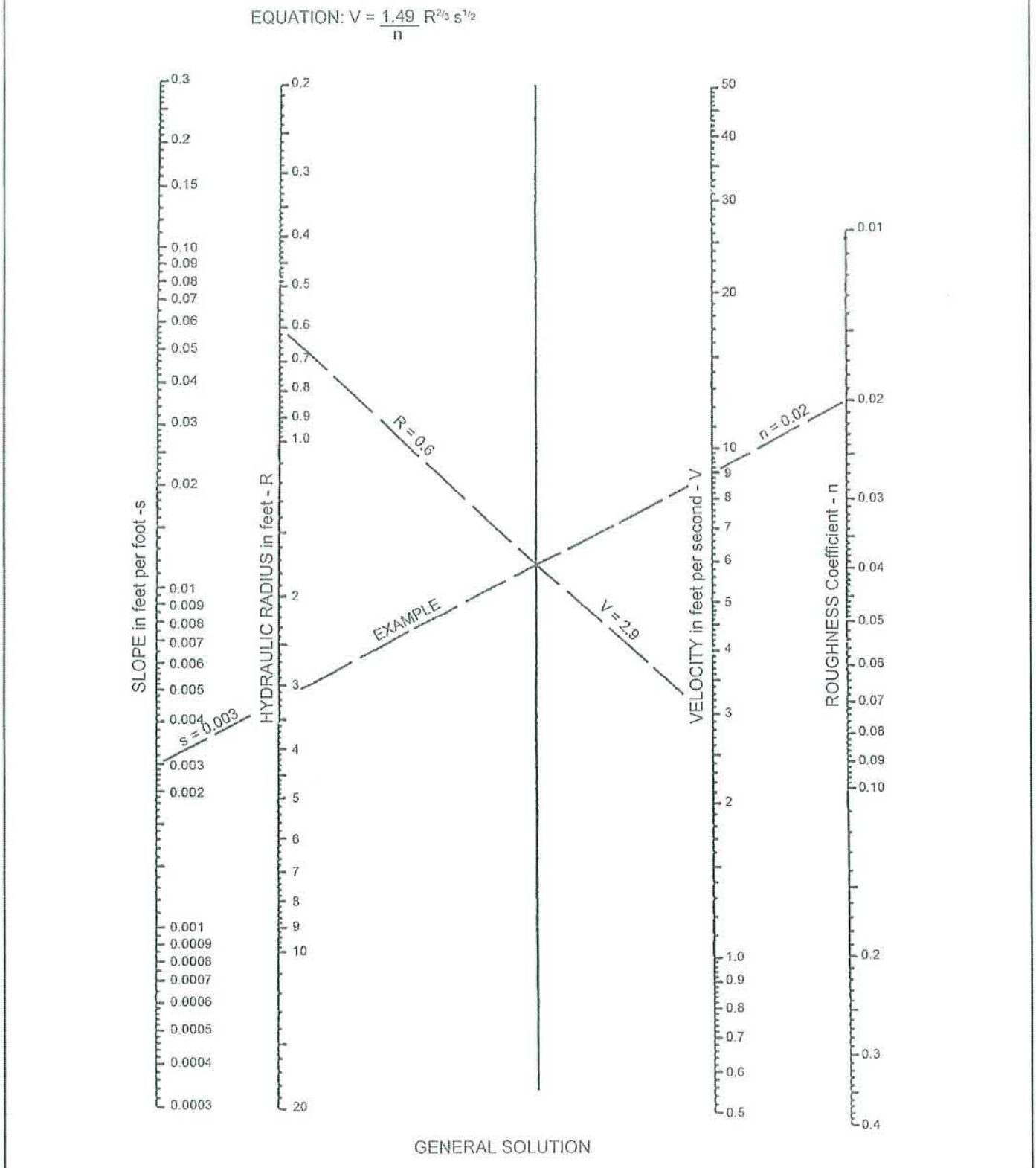


EXAMPLE:
Given: Q = 10 S = 2.5%
Chart gives: Depth = 0.4, Velocity = 4.4 f.p.s.

SOURCE: San Diego County Department of Special District Services Design Manual

FIGURE 3-6

Gutter and Roadway Discharge - Velocity Chart



SOURCE: USDOT, FHWA, HDS-3 (1961)

FIGURE

Manning's Equation Nomograph

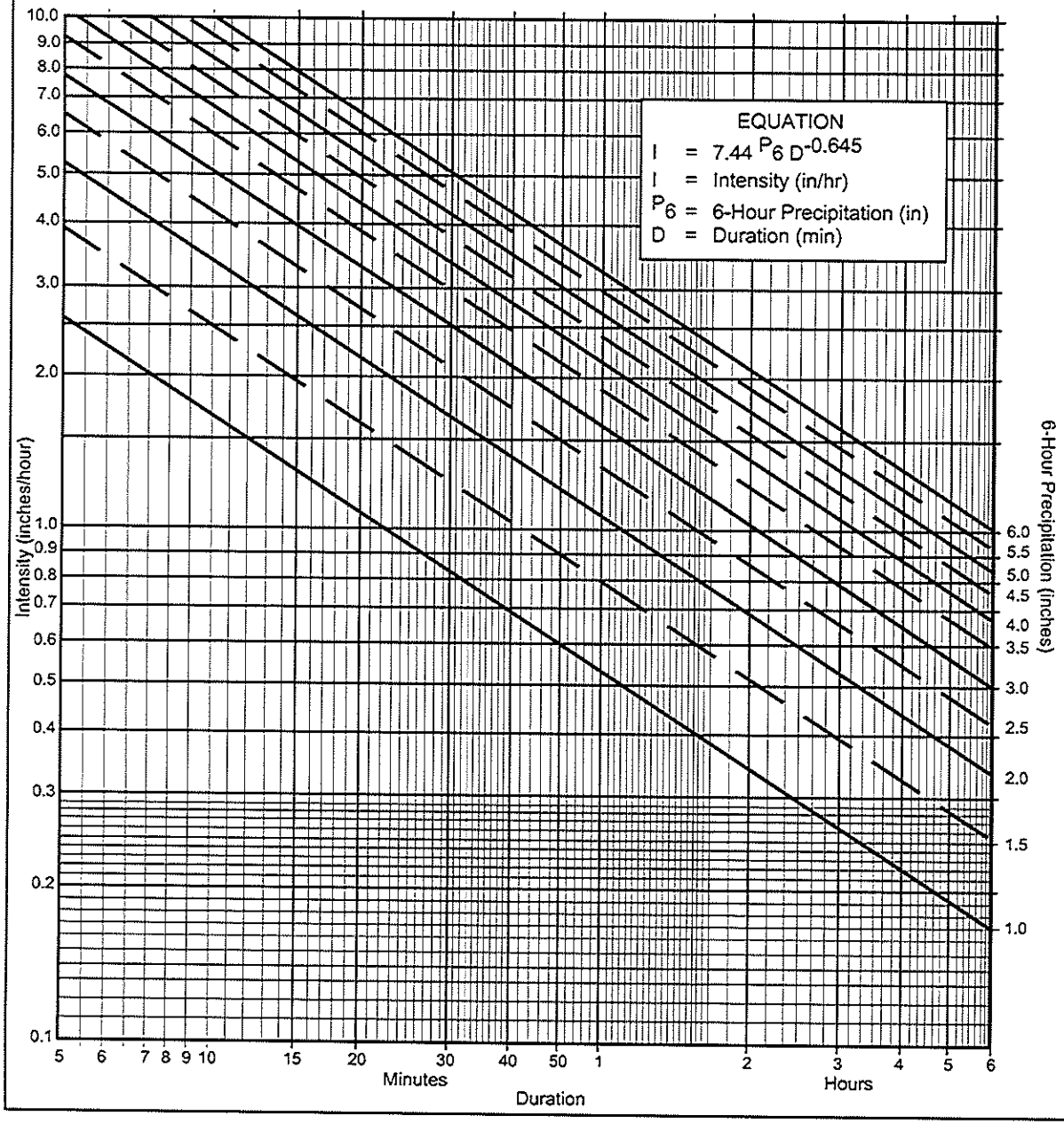
3-7

CHAPTER 2

METHODOLOGY – RATIONAL METHOD PEAK FLOWRATE DETERMINATION (ULTIMATE CONDITIONS)

2.4 – Intensity Duration Design Chart (from San Diego County Hydrology Manual)

VILLAGE 14



Directions for Application:

(1) From precipitation maps determine 6 hr and 24 hr amounts for the selected frequency. These maps are included in the County Hydrology Manual (10, 50, and 100 yr maps included in the Design and Procedure Manual).

(2) Adjust 6 hr precipitation (if necessary) so that it is within the range of 45% to 65% of the 24 hr precipitation (not applicaple to Desert).

(3) Plot 6 hr precipitation on the right side of the chart.

(4) Draw a line through the point parallel to the plotted lines.

(5) This line is the intensity-duration curve for the location being analyzed.

Application Form:

(a) Selected frequency 100 year

(b) P_6 = 3.1 in., P_{24} = 6.0, $\frac{P_6}{P_{24}}$ = 51.67 %(2)

(c) Adjusted P_6(2) = N/A in.

(d) t_x = _____ min.

(e) I = _____ in./hr.

Note: This chart replaces the Intensity-Duration-Frequency curves used since 1965.

P6	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6
Duration											
5	2.63	3.95	5.27	6.59	7.90	9.22	10.54	11.86	13.17	14.49	15.81
7	2.12	3.18	4.24	5.30	6.36	7.42	8.48	9.54	10.60	11.66	12.72
10	1.68	2.53	3.37	4.21	5.05	5.90	6.74	7.58	8.42	9.27	10.11
15	1.30	1.95	2.59	3.24	3.89	4.54	5.19	5.84	6.49	7.13	7.78
20	1.08	1.62	2.15	2.69	3.23	3.77	4.31	4.85	5.39	5.93	6.46
25	0.93	1.40	1.87	2.33	2.80	3.27	3.73	4.20	4.67	5.13	5.60
30	0.83	1.24	1.66	2.07	2.49	2.90	3.32	3.73	4.15	4.56	4.98
40	0.69	1.03	1.38	1.72	2.07	2.41	2.76	3.10	3.45	3.79	4.13
50	0.60	0.90	1.19	1.49	1.79	2.09	2.39	2.69	2.98	3.28	3.58
60	0.53	0.80	1.06	1.33	1.59	1.86	2.12	2.39	2.65	2.92	3.18
90	0.41	0.61	0.82	1.02	1.23	1.43	1.63	1.84	2.04	2.25	2.45
120	0.34	0.51	0.68	0.85	1.02	1.19	1.36	1.53	1.70	1.87	2.04
150	0.29	0.44	0.59	0.73	0.88	1.03	1.18	1.32	1.47	1.62	1.76
180	0.26	0.39	0.52	0.65	0.78	0.91	1.04	1.18	1.31	1.44	1.57
240	0.22	0.33	0.43	0.54	0.65	0.76	0.87	0.98	1.08	1.19	1.30
300	0.19	0.28	0.38	0.47	0.56	0.66	0.75	0.85	0.94	1.03	1.13
360	0.17	0.25	0.33	0.42	0.50	0.58	0.67	0.75	0.84	0.92	1.00

Intensity-Duration Design Chart - Template

FIGURE 3-1

CHAPTER 2 - METHODOLOGY

2.5 – Rational Method Hydrologic Analysis

2.5 Rational Method Hydrologic Analysis

Computer Software Package – AES-2015

Design Storm - 100-year return intervals

Land Use – Single Family/Multi Family development, Schools, Parks & Open Space.

Soil Type – Hydrologic soil group D was assumed for all areas for proposed condition. Group D soils have very slow infiltration rates when thoroughly wetted. Consisting chiefly of clay soils with a high swelling potential, soils with a high permanent water table, soils with clay pan or clay layer at or near the surface, and shallow soils over nearly impervious materials, Group D soils have a very slow rate of water transmission.

Runoff Coefficient – In accordance with the San Diego County Hydrology Manual (SDCHM) Standards, the C coefficient for natural and undeveloped areas is 0.35; the C coefficient for developed areas is a weighted factor of 0.35 (landscape in soil D) and 0.9 (impervious areas) as a function of the fraction of impervious areas (a_i expressed as a decimal value between 0 and 1) according to:

$C = 0.35(1-a_i) + 0.9a_i$

Rainfall Intensity - Initial time of concentration values were determined using the County of San Diego's overland flow nomograph for urban areas. Downstream T_c values are determined by adding the initial sub-basin time of concentration and the downstream routing time. Per SDCHM standards, intensity values were determined from the County of San Diego's Intensity-Duration equation.

Method of Analysis – The Rational Method is the most widely used hydrologic model for estimating peak runoff rates. Applied to small urban and semi-urban areas with drainage areas less than 0.5 square miles, the Rational Method relates storm rainfall intensity, a runoff coefficient, and drainage area to peak runoff rate. This relationship is expressed by the equation:

$Q = CIA$

where:

Q = The peak runoff rate in cubic feet per second at the point of analysis.

C = A runoff coefficient representing the area - averaged ratio of runoff to rainfall intensity.

I = The time-averaged rainfall intensity in inches per hour corresponding to the time of concentration.

A = The drainage basin area in acres.

To perform a node-link study, the total watershed area is divided into subareas which discharge at designated nodes.

The procedure for the subarea summation model is as follows:

(1) Subdivide the watershed into an initial subarea (generally 1 lot in developed conditions or an area with a maximum overland flow length does not exceed values displayed in Table 3.2 of the SDCHM) and subsequent subareas, which are generally less than 10 acres in size. Assign upstream and downstream node numbers to each subarea.

(2) Estimate an initial T_c by using the appropriate nomograph or overland flow velocity estimation.

(3) Using the initial T_c, determine the corresponding values of I. Then Q = C I A.

(4) Using Q, estimate the travel time between this node and the next by Manning's equation as applied to the particular channel or conduit linking the two nodes. Then, repeat the calculation for Q based on the revised intensity (which is a function of the revised time of concentration)

The nodes are joined together by links, which may be street gutter flows, drainage swales, drainage ditches, pipe flow, or various channel flows. The AES-2015 computer subarea menu is as follows:

SUBAREA HYDROLOGIC PROCESS

1. Confluence analysis at node.
2. Initial subarea analysis (including time of concentration calculation).
3. Pipe flow travel time (computer estimated).
4. Pipe flow travel time (user specified).
5. Trapezoidal channel travel time.
6. Street flow analysis through subarea.
7. User - specified information at node.
8. Addition of subarea runoff to main line.
9. V-gutter flow through area.
10. Copy main stream data to memory bank
11. Confluence main stream data with a memory bank
12. Clear a memory bank

At the confluence point of two or more basins, the following procedure is used to combine peak flow rates to account for differences in the basin's times of concentration. This adjustment is based on the assumption that each basin's hydrographs are triangular in shape.

(1). If the collection streams have the same times of concentration, then the Q values are directly summed,

$Q_p = Q_a + Q_b$; $T_p = T_a = T_b$

(2). If the collection streams have different times of concentration, the smaller of the tributary Q values may be adjusted as follows:

(i). The most frequent case is where the collection stream with the longer time of concentration has the larger Q. The smaller Q

value is adjusted by the ratio of rainfall intensities. $Q_p = Q_a + Q_b\ (I_a/I_b)$; $T_p = T_a$

(ii). In some cases, the collection stream with the shorter time of concentration has the larger Q. Then the smaller Q is adjusted by a ratio of the T values.

$Q_p = Q_b + Q_a\ (T_b/T_a)$; $T_p = T_b$

For more than 3 peaks that have a confluence in a discharge area (for example, 23 peaks discharging at the same time in the Otay Reservoir) a similar logic but more complex approach is used:

If "N" peaks are at confluence, and "N" different times of concentration are analyzed, "N" confluence calculations are made at each of the "N" time of concentration values.

Peak flows are arranged from smaller to larger in terms of time of concentration and not in terms of value. For a time of concentration Tc_i belonging to a peak Q_i the peaks whose time of concentration is smaller than Tc_i are adjusted by intensity and the peaks whose time of concentration is larger than Tc_i are adjusted by a ratio of the Tc_i values. The total peak flow with the time of concentration Tc_i (denoted as Q_{TTci}) will be:

$$Q_{TTci} = Q_1 \cdot (I_i/I_1) + Q_2 \cdot (I_i/I_2) + \ldots + Q_i + Q_{i+1}\ (Tc_i/Tc_{i+1}) + \ldots + Q_N \cdot (Tc_i/Tc_N)$$

The confluence peak is chosen as the larger between Q_{TTc1}, Q_{TTc2}, …. , Q_{TTci}, Q_{TTci+1}, …. , Q_{TTcN-1}, Q_{TTcN}

CHAPTER 2 - METHODOLOGY

2.6 – NRCS Unit Hydrograph Hydrologic Analysis

2.6 NRCS Unit Hydrograph Hydrologic Analysis

The Natural Resources Conservation Service (NRCS) Unit Hydrograph is necessary for hydrologic analyses of watershed areas approximately one square mile and greater in size. The HEC-HMS Version 3.5 program was used to produce hydrographs using the NRCS Unit Hydrograph method for this study. HEC-HMS, developed by the United States Army Corps of Engineers' Hydrologic Engineering Center, simulates the surface runoff response of a watershed to precipitation by representing the basin as an interconnected system of hydrologic and hydraulic components.

The NRCS Unit Hydrograph calculations and input parameters follow the guidelines in Section 4 of the 2003 San Diego County Hydrology Manual (SDCHM). The input that was required to produce the hydrographs included rainfall depth, rainfall distribution, drainage basin area, precipitation loss data, and data to determine overland and channel routing information. Output from the model is presented in the form of hydrographs, which are curves relating runoff flowrates to elapsed time from the beginning of rainfall. Thus, the distribution of the entire runoff response is available for analysis.

Rainfall Distribution, Duration & Volume

Runoff for this analysis was generated using the County of San Diego's Nested Storm Hyetograph. The amount of rainfall to be distributed was obtained from the County of San Diego's rainfall isopluvial charts, which are located at the end of this section. This analysis models the 100-year return frequency rainfall event.

Rainfall Loss Criteria

To account for rainfall losses such as infiltration, interception and depression storage, the NRCS Curve Number method was selected. The NRCS method calculates the runoff volume and initial loss based on an empirical curve number, which is determined based on a basin's soil type and land use. Soils in this analysis were based on soil groups taken from the NRCS soil website. In most cases throughout this project, soil type group D was found, which is characterized as soils with very low infiltration rates and high runoff potential (typically clay soils).

Based on the 2003 San Diego County Hydrology Manual, the project site is determined to be located in PZN of 1.7. According to Table 4-6 of the SDCHM, an adjusted PZN of 2.7 was used for 100-year analysis. The following curve numbers were selected corresponding to 'weighted' soil types.

PZN = 2.0	Adjusted PZN = 2.7
87	93
85	91
84	90
70	81

To determine the curve number for a basin containing more than one of the preceding land uses, a composite curve number (weighted average) was calculated using a linear interpolation of the values in Table 4-10 from the SDCHM.

Basin Lag Time

Basin lag times were calculated for both existing and developed conditions based on relationships developed by the United States Army Corps of Engineers. The Corps lag time is defined as the elapsed time (in hours) from the beginning of unit effective rainfall to the instant that runoff hydrograph for a basin reaches 50 percent of the ultimate discharge volume. Per equation 4-17 from the County's Hydrology Manual, the lag time for a basin is calculated using the following empirical relationship.

$$\text{Lag Time (hours)} = 24 * n * [(L * L_c)/ ((S)^{1/2})]^{m}$$

n = basin factor
m = constant (0.38)
L = length of longest watercourse in miles
L_c = length along longest watercourse measured upstream to point opposite center of area (miles)
S = overall slope of longest watercourse (feet per mile)

The basin n factor is the visually estimated mean of the Mannings n values for all the channels within an area. Basin n factors are chosen according to the following criteria.

n = 0.100 The drainage area has extensive vegetation and streams that contain a large amount of brush, grass or other vegetation that slows flow velocity

n = 0.050 Drainage area is rugged, with sharp ridges and steep canyons through which watercourses meander around sharp bends, large boulders, and debris obstruction. The ground cover, excluding small areas of rock outcrops, includes considerable underbrush. No drainage improvements exist in the area.

n = 0.030 Drainage area is generally rolling, with rounded edges and moderate side slopes. Watercourses meander in fairly straight, unimproved channels with some boulders and debris. No drainage improvements exist in the area.

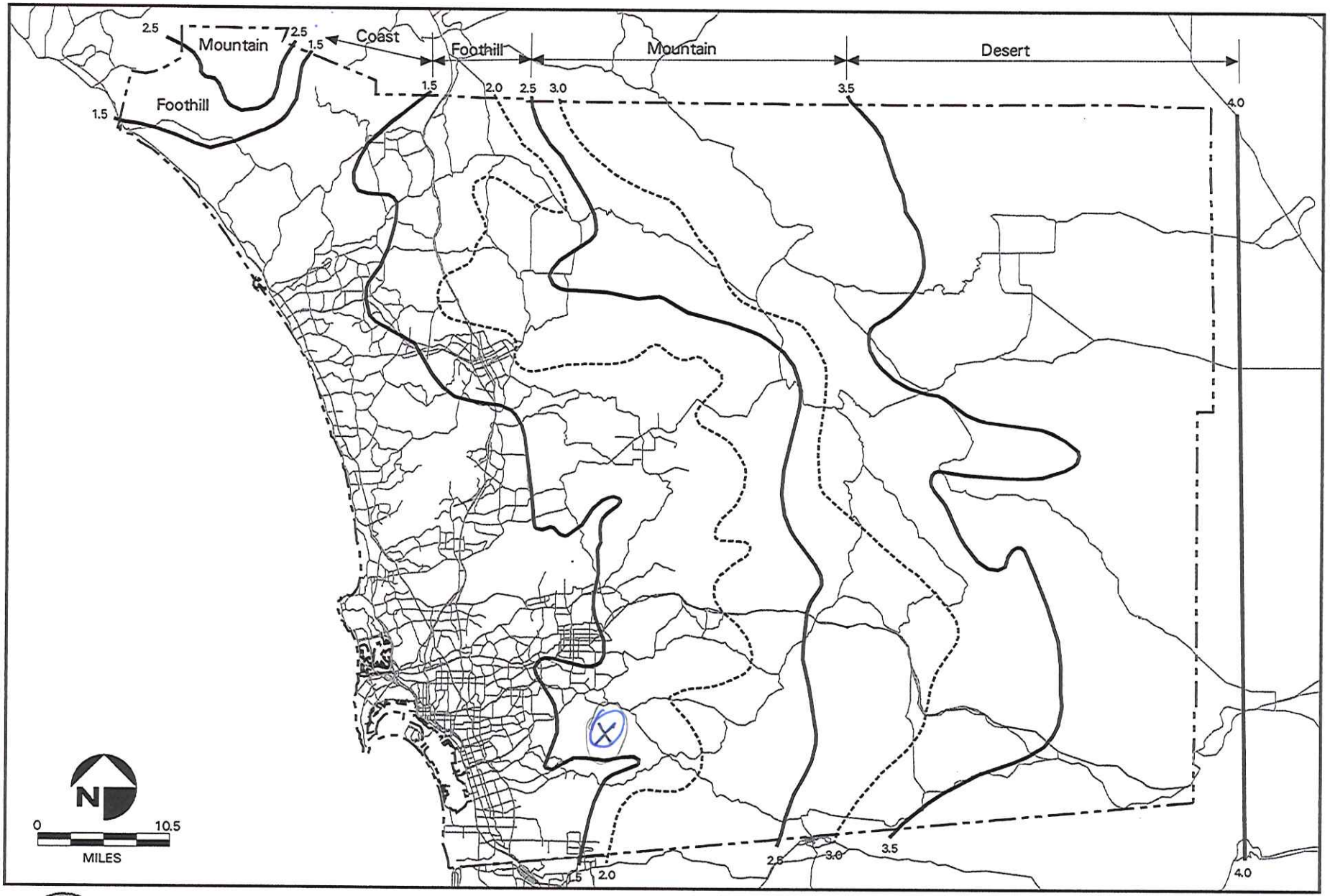
n = 0.015 Drainage area has fairly uniform, gentle slopes with most watercourses either improved or along paved streets. Ground cover consists of grass with appreciable areas developed to the extent that a large percentage of the area is impervious.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — San Diego County Area, California (CA638)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
ClD2	Cieneba coarse sandy loam, 5 to 15 percent slopes, erod ed	D	4.6	0.0%
ClE2	Cieneba coarse sandy loam, 15 to 30 percent slopes, ero ded	D	25.9	0.3%
CmE2	Cieneba rocky coarse sandy loam, 9 to 30 percent slopes , eroded	D	12.5	0.1%
CmrG	Cieneba very rocky coarse sandy loam, 30 to 75 percent slopes	D	454.1	4.4%
DaC	Diablo clay, 2 to 9 percent slopes	D	196.6	1.9%
DaD	Diablo clay, 9 to 15 percent slopes	D	216.6	2.1%
DaE	Diablo clay, 15 to 30 percent slopes	D	326.3	3.2%
DoE	Diablo-Olivenhain complex, 9 to 30 percent slopes	D	137.8	1.3%
EsC	Escondido very fine sandy loam, 5 to 9 percent slopes	C	24.1	0.2%
EsD2	Escondido very fine sandy loam, 9 to 15 percent slopes, eroded	C	56.6	0.5%
FaC2	Fallbrook sandy loam, 5 to 9 percent slopes, eroded	C	55.0	0.5%
FaD2	Fallbrook sandy loam, 9 to 15 percent slopes, eroded	C	139.0	1.3%
FaE2	Fallbrook sandy loam, 15 to 30 percent slopes, eroded	C	52.1	0.5%
FvE	Fallbrook-Vista sandy loams, 15 to 30 percent slopes	C	6.7	0.1%
FwF	Friant fine sandy loam, 30 to 50 percent slopes	D	215.6	2.1%

Hydrologic Soil Group— Summary by Map Unit — San Diego County Area, California (CA638)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
FxE	Friant rocky fine sandy loam, 9 to 30 percent slopes	D	878.1	8.5%
FxG	Friant rocky fine sandy loam, 30 to 70 percent slopes	D	2,296.1	22.2%
LpD2	Las Posas fine sandy loam, 9 to 15 percent slopes, erod ed	C	28.8	0.3%
LpE2	Las Posas fine sandy loam, 15 to 30 percent slopes, ero ded	C	16.0	0.2%
LrE	Las Posas stony fine sandy loam, 9 to 30 percent slopes	C	11.4	0.1%
LsE	Linne clay loam, 9 to 30 percent slopes	C	77.6	0.8%
OhC	Olivenhain cobbly loam, 2 to 9 percent slopes	D	393.7	3.8%
OhE	Olivenhain cobbly loam, 9 to 30 percent slopes	D	855.7	8.3%
PeC	Placentia sandy loam, 2 to 9 percent slopes, warm MAAT, MLRA 19	C	61.5	0.6%
PeC2	Placentia sandy loam, 5 to 9 percent slopes, eroded	D	134.5	1.3%
PeD2	Placentia sandy loam, 9 to 15 percent slopes, eroded	D	10.5	0.1%
PfC	Placentia sandy loam, thick surface, 2 to 9 percent slo pes	D	19.0	0.2%
RaB	Ramona sandy loam, 2 to 5 percent slopes	C	8.5	0.1%
RaC2	Ramona sandy loam, 5 to 9 percent slopes, eroded	C	62.9	0.6%
Rm	Riverwash	D	31.8	0.3%
SnG	San Miguel-Exchequer rocky silt loams, 9 to 70 percent slopes	D	2,987.2	28.9%
VaB	Visalia sandy loam, 2 to 5 percent slopes	A	67.6	0.7%
VaC	Visalia sandy loam, 5 to 9 percent slopes	A	60.3	0.6%
VbB	Visalia gravelly sandy loam, 2 to 5 percent slopes	A	27.8	0.3%

Hydrologic Soil Group— Summary by Map Unit — San Diego County Area, California (CA638)				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
VsE	Vista coarse sandy loam, 15 to 30 percent slopes	B	88.6	0.9%
VvD	Vista rocky coarse sandy loam, 5 to 15 percent slopes	B	20.4	0.2%
VvE	Vista rocky coarse sandy loam, 15 to 30 percent slopes	B	51.3	0.5%
W	Water		134.4	1.3%
WmB	Wyman loam, 2 to 5 percent slopes	C	28.1	0.3%
WmC	Wyman loam, 5 to 9 percent slopes	C	76.8	0.7%
Totals for Area of Interest			**10,351.9**	**100.0%**



County of San Diego Hydrology Manual

Precipitation Zone Numbers (PZN)

FIGURE

C-1

PZN = 1.7

Village 14

Village 14

Table 4-10

RUNOFF CURVE NUMBERS FOR PZN CONDITIONS 1.0, 2.0, AND 3.0

CN For:			CN For:		
PZN Condition = 1.0	PZN Condition = 2.0 2.7	PZN Condition = 3.0	PZN Condition = 1.0	PZN Condition = 2.0 2.7	PZN Condition = 3.0
100	100	100	40	60	78
97	99	100	39	59	77
94	98	99	38	58	76
91	97	99	37	57	75
89	96	99	37	56	75
87	95	98	34	55	73
85	94	98	34	54	73
83	93	98	33	53	72
81	92	97	32	52	71
80	91	97	31	51	70
78	90	96	31	50	70
76	89	96	30	49	69
75	88	95	29	48	68
73	87 93	95	28	47	67
72	86	94	27	46	66
70	85 91	94	26	45	65
68	84 92	93	25	44	64
67	83	93	25	43	63
66	82	92	24	42	62
64	81	92	23	41	61
63	80	91	22	40	60
62	79	91	21	39	59
60	78	90	21	38	58
59	77	89	20	37	57
58	76	89	19	36	56
57	75	88	18	35	55
55	74	88	18	34	54
54	73	87	17	33	53
53	72	86	16	32	52
52	71	86	16	31	51
51	70 81	85	15	30	50
50	69	84			
48	68	84	12	25	43
47	67	83	9	20	37
46	66	82	6	15	30
45	65	82	4	10	22
44	64	81	2	5	13
43	63	80	0	0	0
42	62	79			
41	61	78			

Village 14

The adjustment for PZN Condition may be made to the composite CN for the watershed. It is not necessary to make the PZN Condition adjustment to each of the CNs for the different combinations of ground cover and soil group within the watershed before calculating the composite CN.

Table 4-6

PZN ADJUSTMENT FACTORS FOR FLOW COMPUTATIONS (San Diego County)

Storm Frequency	Coast (PZN = 1.0)	Foothills (PZN = 2.0)	Mountains (PZN = 3.0)	Desert (PZN = 4.0)
Less than 35-year return period	1.5	2.5	2.0	1.5
Greater than or equal to 35-year return period	2.0	3.0	3.0	2.0

Notes: PZN is the precipitation zone number (see Map, Appendix C). The PZN adjustment factor represents the PZN Condition that the CN for the watershed should be adjusted to.

4.1.3 Rainfall-Runoff Relationship

A relationship between accumulated rainfall and accumulated runoff was derived by NRCS from experimental plots for numerous soils and vegetative cover conditions. The following NRCS runoff equation is used to estimate direct runoff from 24-hour or 6-hour storm rainfall. The equation is:

$$Q_a = \frac{(P - I_a)^2}{(P - I_a) + S} \qquad \text{(Eq. 4-1)}$$

where: Q_a = accumulated direct runoff (in)

P = accumulated rainfall (potential maximum runoff) (in)

I_a = initial abstraction including surface storage, interception, evaporation, and infiltration prior to runoff (in)

S = potential maximum soil retention (in)

Table 4-2
RUNOFF CURVE NUMBERS' FOR PZN CONDITION = 2.0

Cover Description	Cover Treatment or Practice[2]	Hydrologic C<mdiu0n3	Average Percent Impervious Area[4]	Curve Numbers for Hydrologic Soil Groups: A	B	C	D
Developing urban areas and newly graded areas (pervious areas only, no vegetation)				77	86	91	94
Impervious areas: Paved parking lots, roofs, and driveways (excluding right-of-way)				98	98	98	98
Residential districts by average lot size:4							
1/8 acre or less (town houses)			65%	77	85	90	92
1/4 acre			38%	61	75	83	87
1/3 acre			30%	57	72	81	86
1/2 acre			25%	54	70	80	85
l acre			20%	51	68	79	84
2 acres			12%	46	65	77	82
Streets and roads	Paved, curbs and storm drains (excluding right-of-way)			98	98	98	98
	Paved, open ditches (including right-of-way)			83	89	92	93
	Gravel (including right-of-way)			76	85	89	91
	Hard surface (including right-of-way)			74	84	90	92
	Dirt (including right-of-way)			72	82	87	89
Urban districts[4]	Commercial and business		85%	89	92	94	95
	Industrial		72%	81	88	91	93
Western desert urban areas:							
Natural desert landscaping (pervious areas 0nly)5				63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with l- to 2-inch sand or gravel mulch and basin borders)				96	96	96	96

Table 4-2 (Continued)
RUNOFF CURVE NUMBERS FOR PZN CONDITION = 2.0

Cover Description	Cover Treatment or Practice[2]	Hydrologic C<mdiu0n3	Average Percent Impervious Area[4]	Curve Numbers for Hydrologic Soil Groups: A	B	C	D
Close-seeded legumes or rotated pasture	Straight row	Poor		66	77	85	89
		Good		58	72	81	85
	Contoured	Poor		64	75	83	85
		Good		55	69	78	83
	Contoured and terraced	Poor		63	73	80	83
		Good		51	67	76	80
Cultivated land	Without conservation treatment			72	81	88	91
	With conservation treatment			62	71	78	81
Fallow	Bare soil			77	86	91	94
	Crop residue cover	Poor		76	85	90	92
		Good		74	83	88	90
Farmsteads (buildings, lanes, driveways, and surrounding lots)				59	74	82	86
Irrigated pasture		Poor		58	74	83	87
		Fair		44	65	77	82
		Good		33	58	72	79
Orchards (deciduous)			(see glossary description)				
Orchards (evergreen)		Poor		57	73	82	86
		Fair		44	65	77	82
		Good		33	58	72	79
Row crops	Straight row	Poor		72	81	88	91
		Good		67	78	85	89
	Contoured	Poor		70	79	84	88
		Good		65	75	82	86

Table 4-2 (Continued)
RUNOFF CURVE NUMBERS FOR PZN CONDITION = 2.0

Cover Description	Cover Treatment or Practice[2]	Hydrologic C<mdiu0n3	Average Percent Impervious Area[4]	Curve Numbers for Hydrologic Soil Groups: A	B	C	D
Small grain	Straight row	Poor		65	76	84	88
		Good		63	75	83	87
	Contoured	Poor		63	74	82	85
		Good		61	73	81	84
Vineyards6	Disked			76	85	90	92
	Annual grass or legume cover	Poor		65	78	85	89
		Fair		50	69	79	84
		Good		38	61	74	80
Annual grass (Maryland pasture)		Poor		67	78	86	89
		Fair		50	69	79	84
		Good		38	61	74	80
Barren				78	86	91	93
Meadow		Poor		63	77	85	88
		Fair		51	70	80	84
		Good		30	58	72	78
Open space (lawns, parks, golf courses, cemeteries, etc.)[7]	Grass cover <50%	Poor		68	79	86	89
	Grass cover 50% to 75%	Fair		49	69	79	84
	Grass cover >75%	Good		39	61	74	80
Pasture or range land		Poor		68	79	86	89
		Fair		49	69	79	84
		Good		39	61	74	80
Perennial grass		Poor		67	79	86	89
		Fair		50	69	79	84
		Good		38	61	74	80

Table 4-2 (Continued)
RUNOFF CURVE NUMBERS FOR PZN CONDITION = 2.0

Cover Description	Cover Treatment or Practice[2]	Hydrologic C<mdiu0n3	Average Percent Impervious Area[4]	Curve Numbers for Hydrologic Soil Groups: A	B	C	D
Turf[3]		Poor		58	74	83	87
		Fair		44	65	77	82
		Good		33	58	72	79
Water surfaces (during Hoods)				97	98	99	99
Broadleaf chaparral		Poor		53	70	80	85
		Fair		40	63	75	81
		Good		31	57	71	78
Desert shrub-major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo Verde, mesquite, and cactus		Poor		63	77	85	88
		Fair		55	72	81	86
		Good		49	68	79	84
Herbaceous-mixture of grass, weeds, and low-growing brush, with brush the minor element		Poor		[9]	80	87	93
		Fair		[9]	71	81	89
		Good		[9]	62	74	85
Narrowleaf chaparral		Poor		71	82	88	91
		Fair		55	72	81	86
Oak-aspen-mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush		Poor		[9]	66	74	79
		Fair		[9]	48	57	63
		Good		[9]	30	41	48
Open brush		Poor		62	76	84	88
		Fair		46	66	77	83
		Good		41	63	75	81

Table 4-2 (Continued)
RUNOFF CURVE NUMBERS FOR PZN CONDITION = 2.0

Cover Description	Cover Treatment or Practice[2]	Hydrologic C<mdiu0n3	Average Percent Impervious Area[4]	Curve Numbers for Hydrologic Soil Groups: A	B	C	D
Pinyon-juniper-pinyon, juniper, or both, grass understory		Poor		[9]	75	85	89
		Fair		[9]	58	73	80
		Good		[9]	41	61	71
Sagebrush with grass understory		Poor		[9]	67	80	85
		Fair		[9]	51	63	70
		Good		[9]	35	47	55
Wood or forest land		Thin stand, poor cover		45	66	77	83
		Good cover		25	55	70	77
Woods (woodland)		Poor		45	66	77	83
		Fair		36	60	73	79
		Good		28	55	70	77
Woodland-grass combination		Poor		57	73	82	86
		Fair		44	65	77	82
		Good		33	58	72	79

[1] Average runoff condition, and la = 0.2S.
[2] Hydrologic practices described as "straight row" and "contoured" are defined in the glossary.
[3] For definition of hydrologic condition, see Tables 4-3, 4-4, and 4-5**.**
[4] The average percent impervious area shown was used to develop the composite CNs. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. If the impervious area is not directly connected, the NRCS method has an adjustment to reduce the effect.
[5] Composite CNs for natural desert landscaping should be computed based on the impervious *area* percentage (CN = 98) and the pervious area CN. The pervious area CNs are assumed equivalent to desert shrub in poor hydrologic condition.
[6] See glossary.
[7] CNs shown are equivalent to those of pasture. Composite CNs may be computed for other combinations of open space cover type.
[8] Includes lawns, cemeteries, golf courses and parks with ground cover of mowed and irrigated perennial grass.
[9] CNs for Group A have not been developed.

Table 4-3

CLASSIFICATION OF NATIVE PASTURE OR RANGE

Vegetative Condition	Hydrologic Condition
Heavily grazed. Has no mulch or has plant cover on less than 50% of the area.	Poor
Not heavily grazed. Has plant cover on 50% to 75% of the area.	Fair
Lightly grazed. Has plant cover on more than 75% of the area.	Good

Table 4-4

AIR-DRY WEIGHT CLASSIFICATION OF NATIVE PASTURE OR RANGE

	Plant and litter air-dry weight (tons per acre):		
Cover density	Less than 0.5	0.5 to 1.5	More than 1.5
Less than 50%	Poor	Poor+	Fair
50% to 75%	Poor+	Fair	Fair+
More than 75%	Fair	Fair+	Good

Table 4-5

CLASSIFICATION OF WOODS

Vegetative Condition	Hydrologic Condition
Heavily grazed or regularly burned. Litter, small trees, and brush are destroyed.	Poor
Grazed but not burned. There may be some litter but these woods are not protected.	Fair
Protected from grazing. Litter and shrubs cover the soil.	Good

Hydrologic Soil Group—San Diego County Area, California
(VILLAGE 14 HYDROLOGIC SOIL GROUPS)

Map Scale: 1:19,000 if printed on D portrait (22" x 34") sheet.
Meters 0 250 500 1000 1500
Feet 0 500 1000 2000 3000
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

Natural Resources Conservation Service

Web Soil Survey
National Cooperative Soil Survey

1/7/2015
Page 1 of 6

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 8, Sep 17, 2014

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 2, 2010—May 6, 2010

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — San Diego County Area, California (CA638)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
ClD2	Cieneba coarse sandy loam, 5 to 15 percent slopes, erod ed	D	4.6	0.0%
ClE2	Cieneba coarse sandy loam, 15 to 30 percent slopes, ero ded	D	25.9	0.3%
CmE2	Cieneba rocky coarse sandy loam, 9 to 30 percent slopes , eroded	D	12.5	0.1%
CmrG	Cieneba very rocky coarse sandy loam, 30 to 75 percent slopes	D	454.1	4.4%
DaC	Diablo clay, 2 to 9 percent slopes	D	196.6	1.9%
DaD	Diablo clay, 9 to 15 percent slopes	D	216.6	2.1%
DaE	Diablo clay, 15 to 30 percent slopes	D	326.3	3.2%
DoE	Diablo-Olivenhain complex, 9 to 30 percent slopes	D	137.8	1.3%
EsC	Escondido very fine sandy loam, 5 to 9 percent slopes	C	24.1	0.2%
EsD2	Escondido very fine sandy loam, 9 to 15 percent slopes, eroded	C	56.6	0.5%
FaC2	Fallbrook sandy loam, 5 to 9 percent slopes, eroded	C	55.0	0.5%
FaD2	Fallbrook sandy loam, 9 to 15 percent slopes, eroded	C	139.0	1.3%
FaE2	Fallbrook sandy loam, 15 to 30 percent slopes, eroded	C	52.1	0.5%
FvE	Fallbrook-Vista sandy loams, 15 to 30 percent slopes	C	6.7	0.1%
FwF	Friant fine sandy loam, 30 to 50 percent slopes	D	215.6	2.1%

Hydrologic Soil Group— Summary by Map Unit — San Diego County Area, California (CA638)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
FxE	Friant rocky fine sandy loam, 9 to 30 percent slopes	D	878.1	8.5%
FxG	Friant rocky fine sandy loam, 30 to 70 percent slopes	D	2,296.1	22.2%
LpD2	Las Posas fine sandy loam, 9 to 15 percent slopes, erod ed	C	28.8	0.3%
LpE2	Las Posas fine sandy loam, 15 to 30 percent slopes, ero ded	C	16.0	0.2%
LrE	Las Posas stony fine sandy loam, 9 to 30 percent slopes	C	11.4	0.1%
LsE	Linne clay loam, 9 to 30 percent slopes	C	77.6	0.8%
OhC	Olivenhain cobbly loam, 2 to 9 percent slopes	D	393.7	3.8%
OhE	Olivenhain cobbly loam, 9 to 30 percent slopes	D	855.7	8.3%
PeC	Placentia sandy loam, 2 to 9 percent slopes, warm MAAT, MLRA 19	C	61.5	0.6%
PeC2	Placentia sandy loam, 5 to 9 percent slopes, eroded	D	134.5	1.3%
PeD2	Placentia sandy loam, 9 to 15 percent slopes, eroded	D	10.5	0.1%
PfC	Placentia sandy loam, thick surface, 2 to 9 percent slo pes	D	19.0	0.2%
RaB	Ramona sandy loam, 2 to 5 percent slopes	C	8.5	0.1%
RaC2	Ramona sandy loam, 5 to 9 percent slopes, eroded	C	62.9	0.6%
Rm	Riverwash	D	31.8	0.3%
SnG	San Miguel-Exchequer rocky silt loams, 9 to 70 percent slopes	D	2,987.2	28.9%
VaB	Visalia sandy loam, 2 to 5 percent slopes	A	67.6	0.7%
VaC	Visalia sandy loam, 5 to 9 percent slopes	A	60.3	0.6%
VbB	Visalia gravelly sandy loam, 2 to 5 percent slopes	A	27.8	0.3%

Hydrologic Soil Group— Summary by Map Unit — San Diego County Area, California (CA638)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
VsE	Vista coarse sandy loam, 15 to 30 percent slopes	B	88.6	0.9%
VvD	Vista rocky coarse sandy loam, 5 to 15 percent slopes	B	20.4	0.2%
VvE	Vista rocky coarse sandy loam, 15 to 30 percent slopes	B	51.3	0.5%
W	Water		134.4	1.3%
WmB	Wyman loam, 2 to 5 percent slopes	C	28.1	0.3%
WmC	Wyman loam, 5 to 9 percent slopes	C	76.8	0.7%
Totals for Area of Interest			**10,351.9**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

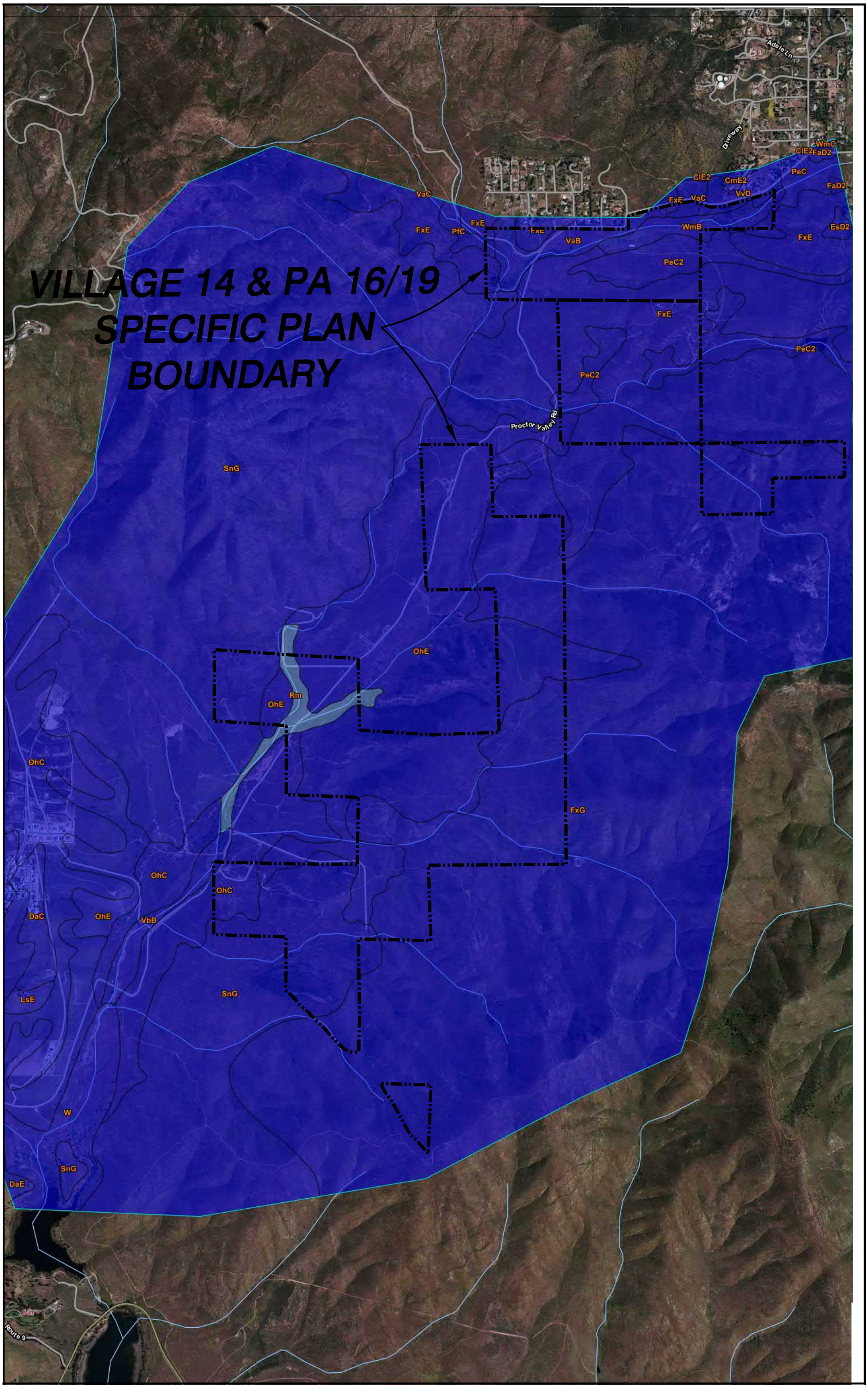
If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Higher


VILLAGE 14 & PA 16/19
SPECIFIC PLAN
BOUNDARY
Adele Ln
Driveway
Proctor Valley Rd
Route 9
VaC
FxE
PfC
VaB
WmB
WmC
CIE2
FaD2
PeC
CmE2
VvD
EsD2
PeC2
SnG
OhE
Rm
OhC
FxG
DaC
VbB
LsE
W
DaE

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Soil Rating Lines
- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Soil Rating Points
- 0 - 25
- 25 - 50
- 50 - 100
- 100 - 150
- 150 - 200
- > 200
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Diego County Area, California
Survey Area Data: Version 8, Sep 17, 2014

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 3, 2010—Jan 4, 2015

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Depth to Water Table

Depth to Water Table— Summary by Map Unit — San Diego County Area, California (CA638)				
Map unit symbol	**Map unit name**	**Rating (centimeters)**	**Acres in AOI**	**Percent of AOI**
DoE	Diablo-Olivenhain complex, 9 to 30 percent slopes	>200	24.1	0.6%
FxE	Friant rocky fine sandy loam, 9 to 30 percent slopes	>200	100.8	2.4%
FxG	Friant rocky fine sandy loam, 30 to 70 percent slopes	>200	1,601.2	38.0%
OhC	Olivenhain cobbly loam, 2 to 9 percent slopes	>200	211.1	5.0%
OhE	Olivenhain cobbly loam, 9 to 30 percent slopes	>200	634.9	15.1%
PeC2	Placentia sandy loam, 5 to 9 percent slopes, eroded	>200	2.7	0.1%
PfC	Placentia sandy loam, thick surface, 2 to 9 percent slo pes	>200	4.3	0.1%
Rm	Riverwash	168	31.8	0.8%
SnG	San Miguel-Exchequer rocky silt loams, 9 to 70 percent slopes	>200	1,556.9	37.0%
VbB	Visalia gravelly sandy loam, 2 to 5 percent slopes	>200	27.8	0.7%
W	Water	>200	17.8	0.4%
Totals for Area of Interest			**4,213.2**	**100.0%**

Description

"Water table" refers to a saturated zone in the soil. It occurs during specified months. Estimates of the upper limit are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Rating Options

Units of Measure: centimeters

Aggregation Method: Dominant Component

Component Percent Cutoff: *None Specified*

Tie-break Rule: Lower

Interpret Nulls as Zero: No

Beginning Month: January

Ending Month: December

CHAPTER 2 - METHODOLOGY

2.7 – Open Channel Inundation Calculations

2.7 Open Channel Inundation Calculations

HEC RAS program was used to model the water surface elevations from the proposed development along Proctor Valley Road and its main tributaries. This resulting flow depths results are included within Chapter 6 of this report.

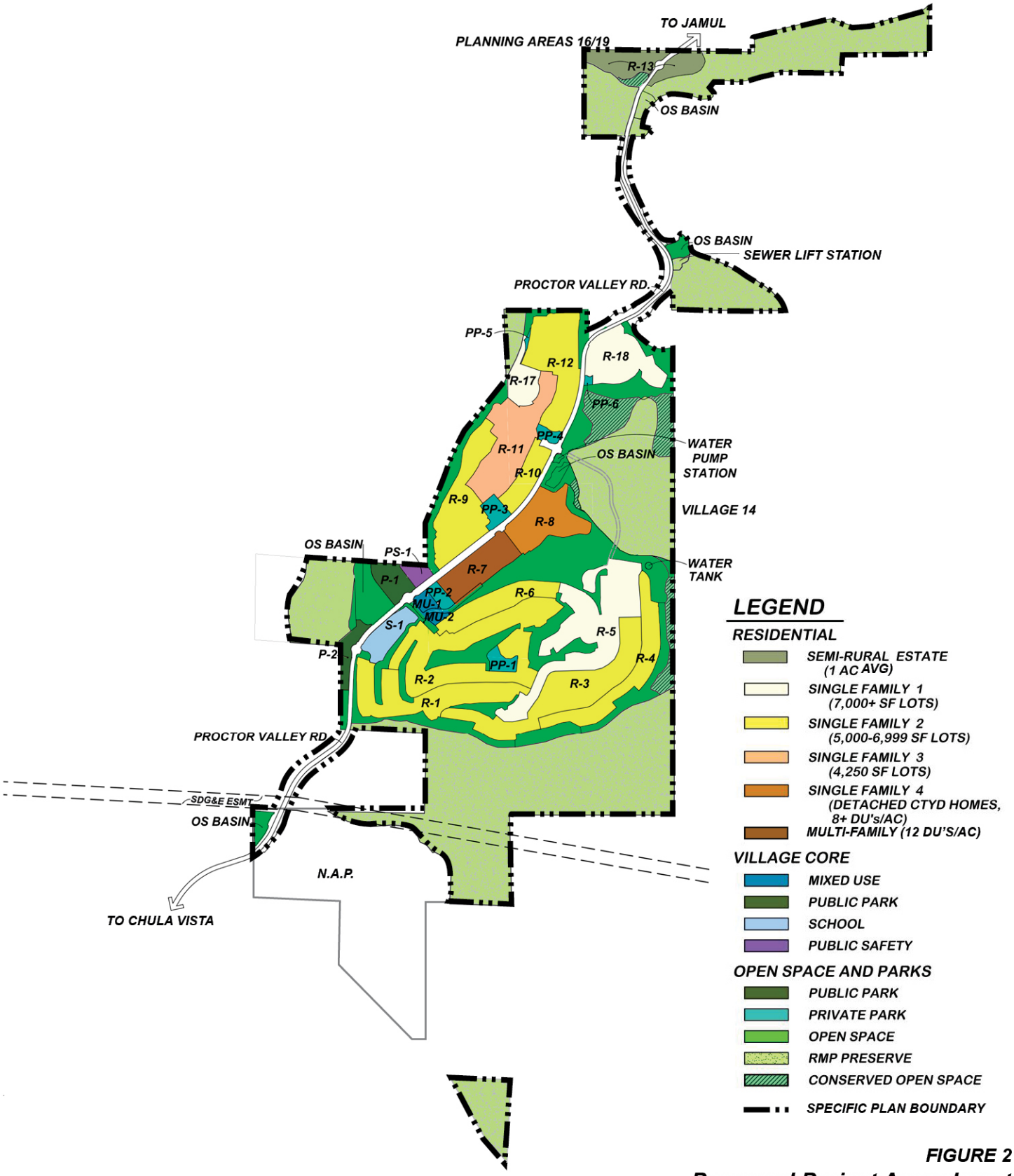


FIGURE 2

Proposed Project Amendment

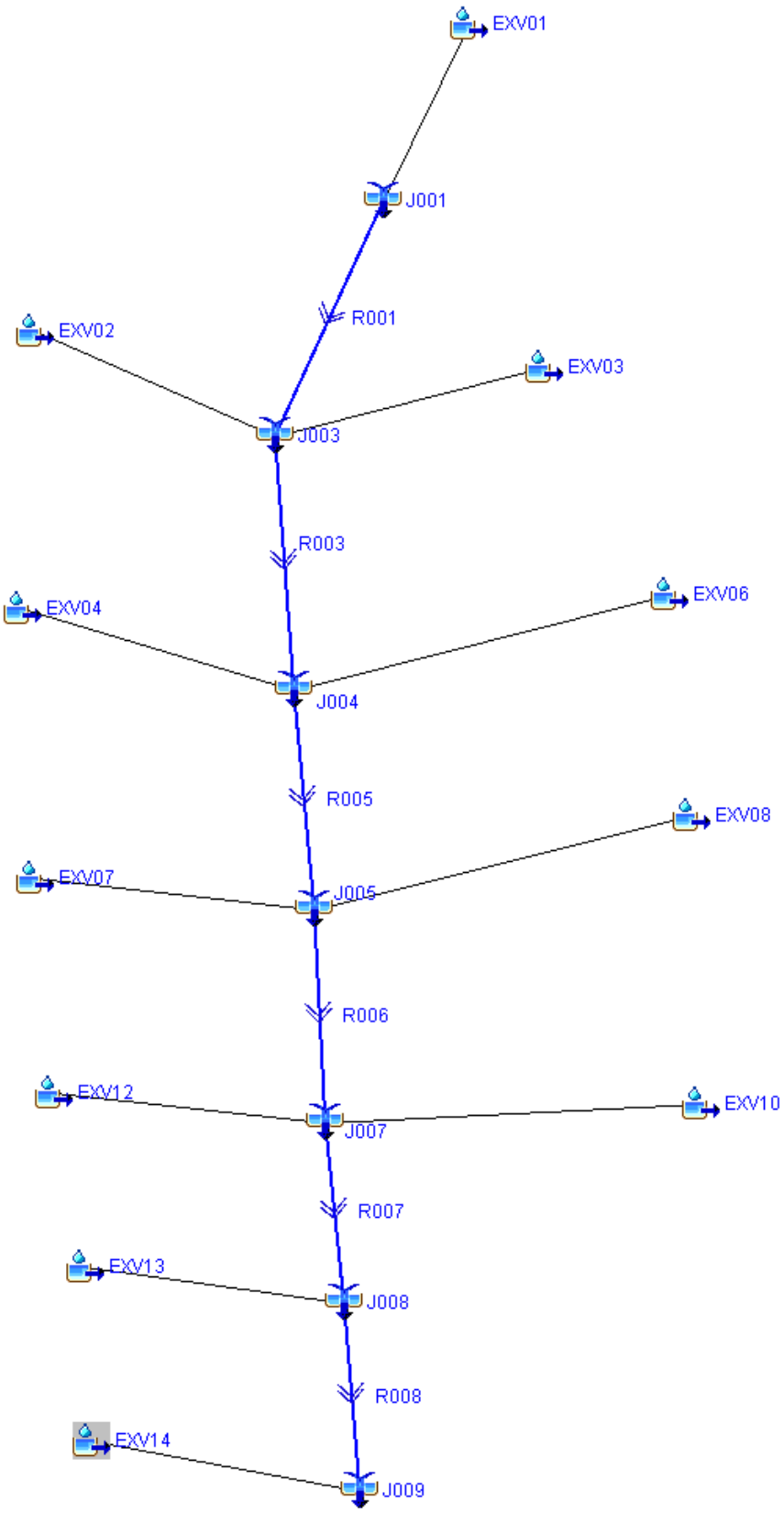
Otay Ranch Village 14 and Planning Areas 16/19

CHAPTER 3

100-Year Unit Hydrograph Hydrologic Model for Existing Conditions

CHAPTER 3

3.1 – Unit Hydrograph Hydrologic Analysis (HEC HMS)


EXV01
J001
R001
EXV02
EXV03
J003
R003
EXV04
EXV06
J004
R005
EXV08
EXV07
J005
R006
EXV12
EXV10
J007
R007
EXV13
J008
R008
EXV14
J009

Existing Conditions

Subarea	Total Acres	Soil Type	Acreage	CN	Soil Type	Acreage	CN	Soil Type	Acreage	CN	Soil Type	Acreage	CN	$CN_{2.0}$	$CN_{2.7}$
EXV01	953.77	A	102	46	B	71.7	62	C	264.5	77	D	515.57	85	77	85
EXV02	932.77	A	25.8	41	B	0	62	C	7.1	74	D	899.87	85	84	90
EXV03	889.16	A	0	41	B	0	62	C	0	74	D	889.16	85	85	91
EXV04	633.99	A	0	41	B	0	62	C	0	74	D	633.99	85	85	91
EXV06	591.83	A	0	41	B	0	62	C	0	74	D	591.83	85	85	91
EXV07	373.90	A	0	41	B	0	62	C	0	74	D	373.90	85	85	91
EXV08	997.21	A	0.9	41	B	0	62	C	0	74	D	996.31	85	85	91
EXV10	429.36	A	3.3	41	B	0	62	C	0	74	D	426.06	85	85	91
EXV12	309.18	A	8.7	41	B	0	62	C	0	74	D	300.48	85	84	90
EXV13	112.53	A	11.9	41	B	0	62	C	0	74	D	100.63	85	80	88
EXV14	656.95	A	3	41	B	0	62	C	19.5	74	D	634.45	85	84	90

Hydrologic Soil Group—San Diego County Area, California
(VILLAGE 14 HYDROLOGIC SOIL GROUPS)

Map Scale: 1:19,000 if printed on D portrait (22" x 34") sheet.
Meters 0 250 500 1000 1500
Feet 0 500 1000 2000 3000
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

Natural Resources Conservation Service

Web Soil Survey
National Cooperative Soil Survey

1/7/2015
Page 1 of 6

HEC-HMS Basin Input-Existing Conditions

Subarea	Area (ft^2)	Area (mi^2)	"n" value	L (ft)	L_c (ft)	L (miles)	L_c (miles)	$Elev_1$ (ft)	$Elev_2$ (ft)	$Elev_{(1-2)}$ (ft)	Slope (ft/mile)	Corps T_1 (hrs)	NRCS T_1 (hrs)	NRCS T_1 (min)
EXV01	41546298.4	1.490	0.050	10200	5571	1.932	1.055	1148.0	868.0	280	144.941	0.61	0.52	31.10
EXV02	40631422.4	1.457	0.050	8232	3865	1.559	0.732	2510.0	820.0	1690	1083.965	0.33	0.28	16.80
EXV03	38731994.7	1.389	0.050	11165	7918	2.115	1.500	2042.0	820.0	1222	577.892	0.56	0.47	28.24
EXV04	27616564.8	0.991	0.050	7749	3323	1.468	0.629	2060.0	618.0	1442	982.547	0.31	0.26	15.76
EXV06	25780074.4	0.925	0.050	11382	5784	2.156	1.095	1910.0	618.0	1292	599.346	0.49	0.42	25.02
EXV07	16286919.6	0.584	0.050	11505	5479	2.179	1.038	2560.0	588.0	1972	905.012	0.45	0.38	22.71
EXV08	43438392.5	1.558	0.050	11576	6847	2.192	1.297	1910.0	588.0	1322	602.985	0.53	0.45	26.85
EXV10	18703089.0	0.671	0.050	9065	6947	1.717	1.316	1870.0	568.0	1302	758.363	0.46	0.39	23.50
EXV11	0.0	0.000	0.050	8973	5061	1.699	0.959	1870.0	580.0	1290	759.077	0.41	0.34	20.69
EXV12	13468052.8	0.483	0.050	6665	4490	1.262	0.850	1095.0	568.0	527	417.488	0.39	0.33	19.76
EXV13	4901874.8	0.176	0.050	2964	2964	0.561	0.561	774.0	558.0	216	384.777	0.25	0.21	12.41
EXV14	28616610.3	1.026	0.050	11978	8327	2.269	1.577	1720.0	515.0	1205	531.174	0.59	0.50	30.08
Total Check	299721293.620	10.751												

Lag Equations from SD County Manual (2003)

Corps $T_1 = 24n((L \times L_c)/(s^{0.5}))^m$

NRCS $T_1 = T_p - 0.5D$

$T_p = 0.862 * \text{Corps } T_1$

HEC-HMS Routing Input-Existing Conditions

Subarea	Reach	U/S Node	D/S Node	Length (ft)	U/S Elev (ft)	D/S Elev (ft)	Slope (ft/ft)	Slope (ft/mi)	"n" value	Channel Type	Dimensions
EXV01	R001	J001	J003	2189	868.0	818.0	0.02284	120.60302	0.05	Trap	50' (W), 3H:1V
EXV04	R003	J003	J004	8460	818.0	618.0	0.02364	124.82270	0.05	Trap	30' (W), 3H:1V
EXV07	R005	J004	J005	2399	618.0	588.0	0.01251	66.02751	0.05	Trap	50' (W), 8H:1V
EXV12	R006	J005	J007	2125	588.0	568.0	0.00941	49.69412	0.05	Trap	50' (W), 8H:1V
EXV13	R007	J007	J008	1409	568.0	558.0	0.00710	37.47339	0.05	Trap	20' (W), 3H:1V
EXV14	R008	J008	J009	4455	558.0	515.0	0.00965	50.96296	0.05	Trap	50' (W), 3H:1V

OTAY RANCH VILLAGE 14

HEC HMS HYETOGRAPH CALCULATIONS

SD COUNTY HYETOGRAPH CALCULATIONS

Area	(sq ft)	(sq mi)	
EXV01	41546298.41	1.49	953.77
EXV02	40631422.43	1.46	932.77
EXV03	38731994.66	1.39	889.16
EXV04	27616564.76	0.99	633.99
EXV06	25780074.4	0.92	591.83
EXV07	16286919.58	0.58	373.90
EXV08	43438392.48	1.56	997.21
EXV10	18703089.01	0.67	429.36
EXV11	0	0.00	0.00
EXV12	13468052.84	0.48	309.18
EXV13	4901874.77	0.18	112.53
EXV14	28616610.28	1.03	656.95
Total	299721293.6	10.75	6880.65

Watershed area	**Rainfall Depth-Area Adjustment Data Points**					
(sq mi)	30	60	180	360	1440	
10	0.9	0.947	0.97	0.98	0.985	Taken from Table 4-1
10.75	**0.895**	**0.943**	**0.969**	**0.979**	**0.984**	Interpolated
20	0.834	0.9	0.952	0.963	0.975	Taken from Table 4-1

P(6)= 3.1 in

RAINFALL DISTRIBUTION SORTED IN ORDER OF INCREASING DURATION

Duration (min)	Rainfall Precipitation for Duration (in)	Depth Area Adjustment for Duration	Depth-Area Adjusted Precipitation (in)	Hyetograph Ordinate (in)
5	0.681	0.895	0.609	0.609
10	0.871	0.895	0.779	0.170
15	1.005	0.895	0.900	0.121
20	1.113	0.895	0.997	0.097
25	1.205	0.895	1.079	0.082
30	1.286	0.895	1.151	0.072
35	1.358	0.903	1.227	0.076
40	1.424	0.911	1.298	0.071
45	1.485	0.919	1.365	0.067
50	1.541	0.927	1.429	0.064
55	1.594	0.935	1.491	0.062
60	1.644	0.943	1.552	0.060
65	1.692	0.945	1.598	0.046
70	1.737	0.946	1.642	0.044
75	1.780	0.947	1.685	0.043
80	1.821	0.948	1.726	0.041
85	1.861	0.949	1.765	0.040
90	1.899	0.950	1.804	0.038
95	1.936	0.951	1.841	0.037
100	1.971	0.952	1.877	0.036
105	2.006	0.953	1.911	0.035
110	2.039	0.954	1.945	0.034
115	2.072	0.955	1.979	0.033
120	2.103	0.956	2.011	0.032
125	2.134	0.957	2.042	0.032
130	2.164	0.958	2.073	0.031
135	2.193	0.959	2.104	0.030
140	2.222	0.960	2.133	0.030
145	2.249	0.961	2.162	0.029
150	2.277	0.962	2.191	0.029
155	2.303	0.963	2.219	0.028
160	2.329	0.964	2.247	0.028
165	2.355	0.966	2.274	0.027
170	2.380	0.967	2.300	0.027
175	2.405	0.968	2.327	0.026

CALCULATED RAINFALL SORTED IN (2/3,1/3) DISTRIBUTION

	Sorted Hyetograph Ordinate (in)
1	0.010
2	0.010
3	0.010
4	0.011
5	0.011
6	0.011
7	0.011
8	0.011
9	0.011
10	0.011
11	0.011
12	0.011
13	0.011
14	0.011
15	0.011
16	0.011
17	0.011
18	0.011
19	0.011
20	0.011
21	0.011
22	0.011
23	0.011
24	0.011
25	0.011
26	0.011
27	0.011
28	0.011
29	0.011
30	0.011
31	0.011
32	0.011
33	0.011
34	0.011
35	0.011

180	2.429	0.969	2.353	0.026	36	0.012
185	2.453	0.969	2.376	0.024	37	0.012
190	2.476	0.969	2.400	0.023	38	0.012
195	2.499	0.969	2.423	0.023	39	0.012
200	2.521	0.970	2.445	0.023	40	0.012
205	2.544	0.970	2.467	0.022	41	0.012
210	2.565	0.970	2.489	0.022	42	0.012
215	2.587	0.971	2.511	0.022	43	0.012
220	2.608	0.971	2.532	0.021	44	0.012
225	2.629	0.971	2.553	0.021	45	0.012
230	2.650	0.971	2.574	0.021	46	0.012
235	2.670	0.972	2.595	0.020	47	0.012
240	2.690	0.972	2.615	0.020	48	0.012
245	2.710	0.972	2.635	0.020	49	0.012
250	2.729	0.973	2.654	0.020	50	0.012
255	2.749	0.973	2.674	0.019	51	0.012
260	2.768	0.973	2.693	0.019	52	0.012
265	2.786	0.973	2.712	0.019	53	0.012
270	2.805	0.974	2.731	0.019	54	0.012
275	2.823	0.974	2.750	0.019	55	0.012
280	2.841	0.974	2.768	0.018	56	0.012
285	2.859	0.975	2.786	0.018	57	0.012
290	2.877	0.975	2.804	0.018	58	0.012
295	2.894	0.975	2.822	0.018	59	0.012
300	2.912	0.975	2.840	0.018	60	0.012
305	2.929	0.976	2.858	0.018	61	0.013
310	2.946	0.976	2.875	0.017	62	0.013
315	2.963	0.976	2.892	0.017	63	0.013
320	2.979	0.976	2.909	0.017	64	0.013
325	2.996	0.977	2.926	0.017	65	0.013
330	3.012	0.977	2.943	0.017	66	0.013
335	3.028	0.977	2.959	0.017	67	0.013
340	3.044	0.978	2.976	0.016	68	0.013
345	3.060	0.978	2.992	0.016	69	0.013
350	3.076	0.978	3.008	0.016	70	0.013
355	3.091	0.978	3.024	0.016	71	0.013
360	3.106	0.979	3.040	0.016	72	0.013
365	3.021	0.979	2.957	0.018	73	0.013
370	3.041	0.979	2.977	0.020	74	0.013
375	3.062	0.979	2.997	0.020	75	0.013
380	3.082	0.979	3.017	0.020	76	0.013
385	3.102	0.979	3.037	0.020	77	0.013
390	3.122	0.979	3.057	0.020	78	0.013
395	3.142	0.979	3.076	0.020	79	0.013
400	3.162	0.979	3.096	0.019	80	0.014
405	3.182	0.979	3.115	0.019	81	0.014
410	3.202	0.979	3.134	0.019	82	0.014
415	3.221	0.979	3.153	0.019	83	0.014
420	3.240	0.979	3.172	0.019	84	0.014
425	3.260	0.979	3.191	0.019	85	0.014
430	3.279	0.979	3.210	0.019	86	0.014
435	3.298	0.979	3.229	0.019	87	0.014
440	3.317	0.979	3.247	0.019	88	0.014
445	3.335	0.979	3.266	0.018	89	0.014
450	3.354	0.979	3.284	0.018	90	0.014
455	3.373	0.979	3.303	0.018	91	0.014
460	3.391	0.979	3.321	0.018	92	0.014
465	3.410	0.979	3.339	0.018	93	0.014
470	3.428	0.979	3.357	0.018	94	0.014
475	3.446	0.979	3.375	0.018	95	0.014
480	3.464	0.979	3.393	0.018	96	0.015
485	3.482	0.979	3.410	0.018	97	0.015
490	3.500	0.979	3.428	0.018	98	0.015
495	3.518	0.979	3.445	0.018	99	0.015
500	3.536	0.979	3.463	0.017	100	0.015
505	3.553	0.979	3.480	0.017	101	0.015

510	3.571	0.979	3.497	0.017	102	0.015
515	3.588	0.980	3.515	0.017	103	0.015
520	3.606	0.980	3.532	0.017	104	0.015
525	3.623	0.980	3.549	0.017	105	0.015
530	3.640	0.980	3.566	0.017	106	0.015
535	3.657	0.980	3.583	0.017	107	0.015
540	3.674	0.980	3.599	0.017	108	0.016
545	3.691	0.980	3.616	0.017	109	0.016
550	3.708	0.980	3.633	0.017	110	0.016
555	3.725	0.980	3.649	0.017	111	0.016
560	3.742	0.980	3.666	0.016	112	0.016
565	3.758	0.980	3.682	0.016	113	0.016
570	3.775	0.980	3.699	0.016	114	0.016
575	3.791	0.980	3.715	0.016	115	0.016
580	3.808	0.980	3.731	0.016	116	0.016
585	3.824	0.980	3.747	0.016	117	0.016
590	3.841	0.980	3.763	0.016	118	0.017
595	3.857	0.980	3.779	0.016	119	0.017
600	3.873	0.980	3.795	0.016	120	0.017
605	3.889	0.980	3.811	0.016	121	0.017
610	3.905	0.980	3.827	0.016	122	0.017
615	3.921	0.980	3.843	0.016	123	0.017
620	3.937	0.980	3.858	0.016	124	0.017
625	3.953	0.980	3.874	0.016	125	0.017
630	3.969	0.980	3.890	0.016	126	0.018
635	3.984	0.980	3.905	0.016	127	0.018
640	4.000	0.980	3.921	0.015	128	0.018
645	4.016	0.980	3.936	0.015	129	0.018
650	4.031	0.980	3.951	0.015	130	0.018
655	4.047	0.980	3.967	0.015	131	0.018
660	4.062	0.980	3.982	0.015	132	0.018
665	4.077	0.980	3.997	0.015	133	0.018
670	4.093	0.980	4.012	0.015	134	0.019
675	4.108	0.980	4.027	0.015	135	0.019
680	4.123	0.980	4.042	0.015	136	0.019
685	4.138	0.980	4.057	0.015	137	0.019
690	4.153	0.980	4.072	0.015	138	0.019
695	4.168	0.980	4.087	0.015	139	0.019
700	4.183	0.980	4.102	0.015	140	0.020
705	4.198	0.980	4.116	0.015	141	0.020
710	4.213	0.981	4.131	0.015	142	0.020
715	4.228	0.981	4.146	0.015	143	0.020
720	4.243	0.981	4.160	0.015	144	0.016
725	4.257	0.981	4.175	0.015	145	0.016
730	4.272	0.981	4.189	0.014	146	0.016
735	4.287	0.981	4.204	0.014	147	0.016
740	4.301	0.981	4.218	0.014	148	0.017
745	4.316	0.981	4.232	0.014	149	0.017
750	4.330	0.981	4.247	0.014	150	0.017
755	4.345	0.981	4.261	0.014	151	0.017
760	4.359	0.981	4.275	0.014	152	0.018
765	4.373	0.981	4.289	0.014	153	0.018
770	4.387	0.981	4.303	0.014	154	0.018
775	4.402	0.981	4.317	0.014	155	0.018
780	4.416	0.981	4.331	0.014	156	0.019
785	4.430	0.981	4.345	0.014	157	0.019
790	4.444	0.981	4.359	0.014	158	0.019
795	4.458	0.981	4.373	0.014	159	0.020
800	4.472	0.981	4.387	0.014	160	0.020
805	4.486	0.981	4.401	0.014	161	0.020
810	4.500	0.981	4.415	0.014	162	0.021
815	4.514	0.981	4.428	0.014	163	0.021
820	4.528	0.981	4.442	0.014	164	0.022
825	4.541	0.981	4.456	0.014	165	0.022
830	4.555	0.981	4.469	0.014	166	0.023
835	4.569	0.981	4.483	0.014	167	0.023

OTAY RANCH VILLAGE 14

HEC HMS HYETOGRAPH CALCULATIONS

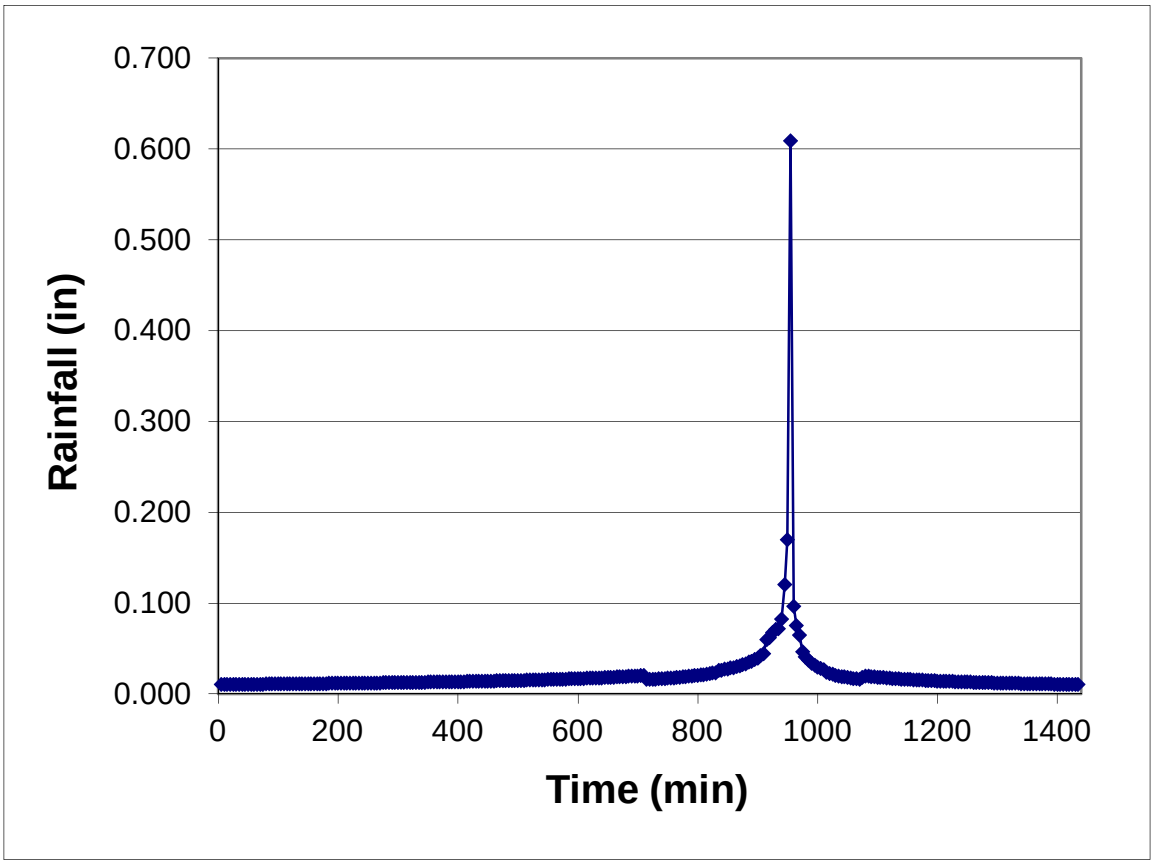
840	4.583	0.981	4.496	0.014	168	0.026
845	4.596	0.981	4.510	0.013	169	0.026
850	4.610	0.981	4.523	0.013	170	0.027
855	4.623	0.981	4.537	0.013	171	0.028
860	4.637	0.981	4.550	0.013	172	0.029
865	4.650	0.981	4.563	0.013	173	0.029
870	4.664	0.981	4.577	0.013	174	0.030
875	4.677	0.981	4.590	0.013	175	0.031
880	4.690	0.981	4.603	0.013	176	0.032
885	4.704	0.981	4.616	0.013	177	0.033
890	4.717	0.981	4.629	0.013	178	0.035
895	4.730	0.981	4.643	0.013	179	0.036
900	4.743	0.981	4.656	0.013	180	0.038
905	4.757	0.982	4.669	0.013	181	0.040
910	4.770	0.982	4.682	0.013	182	0.043
915	4.783	0.982	4.695	0.013	183	0.044
920	4.796	0.982	4.708	0.013	184	0.060
925	4.809	0.982	4.720	0.013	185	0.062
930	4.822	0.982	4.733	0.013	186	0.067
935	4.835	0.982	4.746	0.013	187	0.071
940	4.848	0.982	4.759	0.013	188	0.072
945	4.861	0.982	4.772	0.013	189	0.082
950	4.873	0.982	4.784	0.013	190	0.121
955	4.886	0.982	4.797	0.013	191	0.170
960	4.899	0.982	4.810	0.013	192	0.609
965	4.912	0.982	4.822	0.013	193	0.097
970	4.924	0.982	4.835	0.013	194	0.076
975	4.937	0.982	4.848	0.013	195	0.064
980	4.950	0.982	4.860	0.013	196	0.046
985	4.962	0.982	4.873	0.013	197	0.041
990	4.975	0.982	4.885	0.012	198	0.037
995	4.987	0.982	4.898	0.012	199	0.034
1000	5.000	0.982	4.910	0.012	200	0.032
1005	5.012	0.982	4.922	0.012	201	0.030
1010	5.025	0.982	4.935	0.012	202	0.028
1015	5.037	0.982	4.947	0.012	203	0.027
1020	5.050	0.982	4.959	0.012	204	0.024
1025	5.062	0.982	4.972	0.012	205	0.023
1030	5.074	0.982	4.984	0.012	206	0.022
1035	5.087	0.982	4.996	0.012	207	0.021
1040	5.099	0.982	5.008	0.012	208	0.020
1045	5.111	0.982	5.020	0.012	209	0.019
1050	5.123	0.982	5.033	0.012	210	0.019
1055	5.136	0.982	5.045	0.012	211	0.018
1060	5.148	0.982	5.057	0.012	212	0.018
1065	5.160	0.982	5.069	0.012	213	0.017
1070	5.172	0.982	5.081	0.012	214	0.017
1075	5.184	0.982	5.093	0.012	215	0.016
1080	5.196	0.982	5.105	0.012	216	0.018
1085	5.208	0.982	5.117	0.012	217	0.020
1090	5.220	0.982	5.129	0.012	218	0.020
1095	5.232	0.982	5.140	0.012	219	0.019
1100	5.244	0.983	5.152	0.012	220	0.019
1105	5.256	0.983	5.164	0.012	221	0.019
1110	5.268	0.983	5.176	0.012	222	0.018
1115	5.280	0.983	5.188	0.012	223	0.018
1120	5.292	0.983	5.199	0.012	224	0.018
1125	5.303	0.983	5.211	0.012	225	0.017
1130	5.315	0.983	5.223	0.012	226	0.017
1135	5.327	0.983	5.235	0.012	227	0.017
1140	5.339	0.983	5.246	0.012	228	0.017
1145	5.350	0.983	5.258	0.012	229	0.016
1150	5.362	0.983	5.269	0.012	230	0.016
1155	5.374	0.983	5.281	0.012	231	0.016
1160	5.385	0.983	5.293	0.012	232	0.016
1165	5.397	0.983	5.304	0.012	233	0.016

1170	5.408	0.983	5.316	0.012	234	0.016
1175	5.420	0.983	5.327	0.011	235	0.015
1180	5.431	0.983	5.339	0.011	236	0.015
1185	5.443	0.983	5.350	0.011	237	0.015
1190	5.454	0.983	5.361	0.011	238	0.015
1195	5.466	0.983	5.373	0.011	239	0.015
1200	5.477	0.983	5.384	0.011	240	0.015
1205	5.489	0.983	5.396	0.011	241	0.014
1210	5.500	0.983	5.407	0.011	242	0.014
1215	5.511	0.983	5.418	0.011	243	0.014
1220	5.523	0.983	5.429	0.011	244	0.014
1225	5.534	0.983	5.441	0.011	245	0.014
1230	5.545	0.983	5.452	0.011	246	0.014
1235	5.557	0.983	5.463	0.011	247	0.014
1240	5.568	0.983	5.474	0.011	248	0.013
1245	5.579	0.983	5.486	0.011	249	0.013
1250	5.590	0.983	5.497	0.011	250	0.013
1255	5.601	0.983	5.508	0.011	251	0.013
1260	5.612	0.983	5.519	0.011	252	0.013
1265	5.624	0.983	5.530	0.011	253	0.013
1270	5.635	0.983	5.541	0.011	254	0.013
1275	5.646	0.983	5.552	0.011	255	0.013
1280	5.657	0.983	5.563	0.011	256	0.013
1285	5.668	0.983	5.574	0.011	257	0.013
1290	5.679	0.983	5.585	0.011	258	0.012
1295	5.690	0.984	5.596	0.011	259	0.012
1300	5.701	0.984	5.607	0.011	260	0.012
1305	5.712	0.984	5.618	0.011	261	0.012
1310	5.723	0.984	5.629	0.011	262	0.012
1315	5.734	0.984	5.640	0.011	263	0.012
1320	5.745	0.984	5.651	0.011	264	0.012
1325	5.755	0.984	5.661	0.011	265	0.012
1330	5.766	0.984	5.672	0.011	266	0.012
1335	5.777	0.984	5.683	0.011	267	0.012
1340	5.788	0.984	5.694	0.011	268	0.012
1345	5.799	0.984	5.705	0.011	269	0.012
1350	5.809	0.984	5.715	0.011	270	0.011
1355	5.820	0.984	5.726	0.011	271	0.011
1360	5.831	0.984	5.737	0.011	272	0.011
1365	5.842	0.984	5.747	0.011	273	0.011
1370	5.852	0.984	5.758	0.011	274	0.011
1375	5.863	0.984	5.769	0.011	275	0.011
1380	5.874	0.984	5.779	0.011	276	0.011
1385	5.884	0.984	5.790	0.011	277	0.011
1390	5.895	0.984	5.801	0.011	278	0.011
1395	5.906	0.984	5.811	0.011	279	0.011
1400	5.916	0.984	5.822	0.011	280	0.011
1405	5.927	0.984	5.832	0.011	281	0.011
1410	5.937	0.984	5.843	0.011	282	0.011
1415	5.948	0.984	5.853	0.011	283	0.011
1420	5.958	0.984	5.864	0.010	284	0.011
1425	5.969	0.984	5.874	0.010	285	0.011
1430	5.979	0.984	5.885	0.010	286	0.011
1435	5.990	0.984	5.895	0.010	287	0.010
1440	6.000	0.984	5.905	0.010	288	0.010

OTAY RANCH VILLAGE 14

HEC HMS HYETOGRAPH CALCULATIONS

CALCULATED RAINFALL SORTED IN (2/3,1/3) DISTRIBUTION



CHAPTER 3

3.2 – Existing Condition Hydrology Map

VILLAGE 14 & PA 16/19 SPECIFIC PLAN BOUNDARY

EXV01
953.77 acres

EXV02
932.77 acres

EXV03
889.16 acres

EXV04
633.99 acres

EXV06
591.83 acres

EXV07
373.90 acres

EXV08
997.21 acres

EXV10
429.36 acres

EXV12
309.18 acres

EXV013
112.53 acres

EXV14
656.95 acres

J001
Q100 = 1,548 cfs

J003
Q100 = 4,934 cfs

J004
Q100 = 7,078 cfs

J005
Q100 = 9,667 cfs

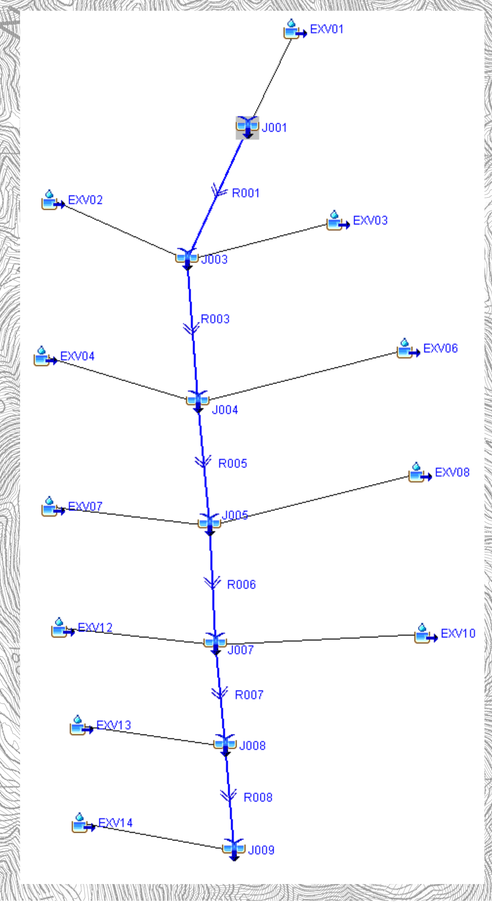
J007
Q100 = 10,957 cfs

Q100 = 881 cfs

J008
Q100 = 10,992 cfs

J009
Q100 = 12,027 cfs

PROCTOR VALLEY ROAD



LEGEND:

EXVxx
xx.xx acres — DRAINAGE AREA

SUBAREA BOUNDARY

PREPARED BY:

HUNSAKER & ASSOCIATES SAN DIEGO, INC

PLANNING 9707 Waples Street
ENGINEERING San Diego, Ca 92121
SURVEYING PH(858)558-4500 · FX(858)558-1414

EXHIBIT 3.1
EXISTING CONDITION HEC-HMS HYDROLOGY MAP
OTAY RANCH VILLAGE 14 & PA 16/19
COUNTY OF SAN DIEGO, CALIFORNIA

W.O.# 2421-0051

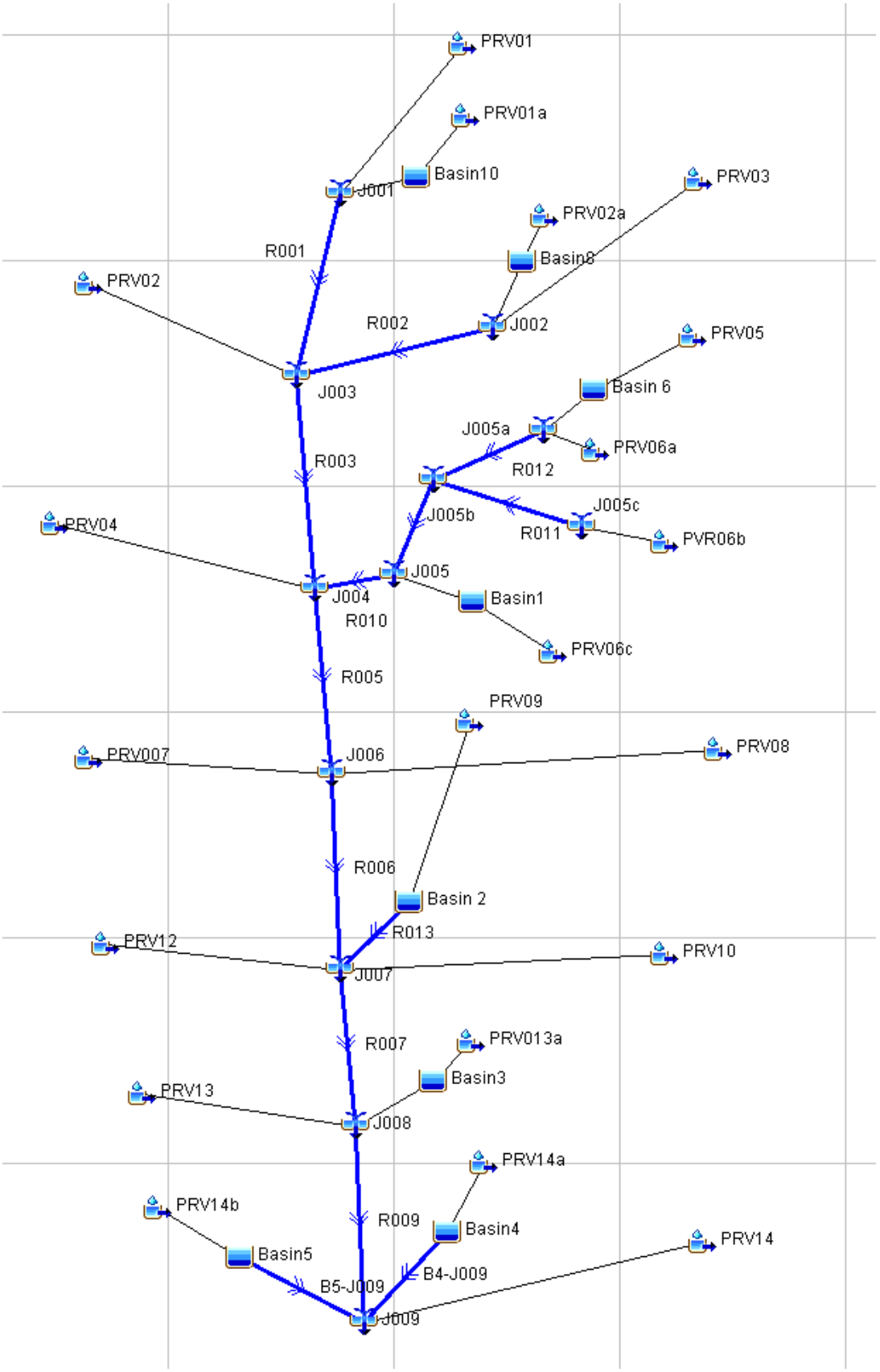
R: \1235\Hyd\ACAD\HYDRO\TM-SRP\1235- HEC HMS V14- EX-SRP.dwg[]Nov-04-2019:11:57

CHAPTER 4

100-Year Unit Hydrograph Hydrologic Model for Proposed Conditions

CHAPTER 4

4.1 – Unit Hydrograph Hydrologic Analysis (HEC HMS)


PRV01
PRV01a
Basin10
J001
PRV03
PRV02a
Basin8
R001
PRV02
R002
J002
PRV05
J003
Basin 6
J005a
PRV06a
R003
R012
J005c
J005b
R011
PRV04
PVR06b
J005
J004
Basin1
R010
PRV06c
R005
PRV09
PRV007
J006
PRV08
R006
Basin 2
R013
PRV12
PRV10
J007
R007
PRV013a
Basin3
PRV13
J008
PRV14a
PRV14b
R009
Basin4
PRV14
Basin5
B4-J009
B5-J009
J009

Proposed Conditions

Subarea	Total Acres	Soil Type	Acreage	CN	Soil Type	Acreage	CN	Soil Type	Acreage	CN	Soil Type	Acreage	CN	$CN_{2.0}$	$CN_{2.7}$
PRV01	943.13	A	89.35	46	B	71.7	62	C	264.5	77	D	517.58	85	77	85
PRV01a	12.65	A	8	51	B	0	68	C	0	79	D	4.65	84	63	75
PRV02	1023.65	A	25.8	41	B	0	62	C	7.1	74	D	990.75	85	84	90
PRV02a	2.10	A	0	83	B	0	89	C	0	92	D	2.10	93	93	97
PRV03	793.70	A	0	41	B	0	62	C	0	74	D	793.70	85	85	91
PRV04	593.26	A	0	41	B	0	62	C	0	74	D	593.26	85	85	91
PRV05	86.13	A	0	77	B	0	85	C	0	90	D	86.13	92	92	96
PRV06a	247.59	A	0	41	B	0	62	C	0	74	D	247.59	85	85	91
PRV06b	90.89	A	0	41	B	0	62	C	0	74	D	90.89	85	85	91
PRV06c	226.54	A	0	77	B	0	85	C	0	90	D	226.54	92	92	96
PRV07	415.08	A	0	41	B	0	62	C	0	74	D	415.08	85	85	91
PRV08	834.49	A	0.9	41	B	0	62	C	0	74	D	833.59	85	85	91
PRV09	104.92	A	0	77	B	0	85	C	0	90	D	104.92	92	92	96
PRV10	411.75	A	3.3	41	B	0	62	C	0	74	D	408.45	85	85	91
PRV12	322.71	A	8.7	41	B	0	62	C	0	74	D	314.01	85	84	90
PRV13	74.77	A	5.9	41	B	0	62	C	0	74	D	68.87	85	82	89
PRV13a	6.11	A	2	83	B	0	89	C	0	92	D	4.11	93	90	93
PRV14	680.97	A	3	77	B	0	85	C	19.5	90	D	658.47	85	85	91
PRV14a	3.55	A	0	83	B	0	89	C	0	92	D	3.55	93	93	97
PRV14b	6.64	A	0	83	B	0	89	C	0	92	D	6.64	93	93	97

HEC-HMS Basin Input-Proposed Conditions

Subarea	Area (ft^2)	Area (mi^2)	Area (acres)	Accu. (acres)	"n" value	L (ft)	L_c (ft)	L (miles)	L_c (miles)	$Elev_1$ (ft)	$Elev_2$ (ft)	$Elev_{(1-2)}$ (ft)	Slope (ft/mile)	Corps T_1 (hrs)	NRCS T_1 (hrs)	NRCS T_1 (min)
PRV01	41,082,829	1.474	943.132	943.132	0.050	10200	5571	1.932	1.055	1148.0	868.0	280	144.941	0.61	0.52	31.10
PRV01a	550,982	0.020	12.649	955.781	0.018	2689	1530	0.509	0.290	912.0	880.0	32	62.834	0.10	0.07	4.42
PRV02	44,590,281	1.599	1023.652	1979.433	0.050	8232	3865	1.559	0.732	2510.0	820.0	1690	1083.965	0.33	0.28	16.80
PRV02a	91,649	0.003	2.104	1981.537	0.018	1728	776	0.327	0.147	914.3	899.0	15.3	46.750	0.07	0.05	2.90
PRV03	34,573,628	1.240	793.701	2775.238	0.050	10119	5744	1.916	1.088	1620.0	890.0	730	380.907	0.51	0.43	26.03
PRV04	25,842,568	0.927	593.264	3368.502	0.050	7749	3323	1.468	0.629	2060.0	618.0	1442	982.547	0.31	0.26	15.76
PRV05	3,751,898	0.135	86.132	3454.634	0.018	3834	531	0.726	0.101	1000.0	734.0	266	366.322	0.05	0.04	2.19
PRV06a	10,784,981	0.387	247.589	3702.223	0.050	6255	2880	1.185	0.545	1910.0	780.0	1130	953.861	0.28	0.23	13.78
PRV06b	3,959,006	0.142	90.886	3793.109	0.050	2969	1491	0.562	0.282	1540.0	820.0	720	1280.431	0.15	0.12	7.42
PRV06c	9,868,236	0.354	226.544	4019.652	0.018	6203	1513	1.175	0.287	990.0	653.0	337	286.855	0.10	0.08	4.54
PRV07	18,080,935	0.649	415.081	4434.734	0.050	11515	5479	2.181	1.038	2560.0	588.0	1972	904.226	0.45	0.38	22.72
PRV08	36,350,516	1.304	834.493	5269.227	0.050	11576	6847	2.192	1.297	1910.0	588.0	1322	602.985	0.53	0.45	26.85
PRV09	4,570,366	0.164	104.921	5374.148	0.018	11554	7724	2.188	1.463	1000.0	560.0	440	201.073	0.25	0.20	12.19
PRV10	17,935,965	0.643	411.753	5785.901	0.050	9065	6947	1.717	1.316	1870.0	580.0	1290	751.373	0.46	0.39	23.54
PRV12	14,057,261	0.504	322.710	6108.611	0.050	6665	4490	1.262	0.850	1095.0	568.0	527	417.488	0.39	0.33	19.76
PRV13	3,256,792	0.117	74.766	6183.377	0.050	2752	1147	0.521	0.217	774.0	558.0	216	414.419	0.17	0.14	8.13
PRV13a	266,205	0.010	6.111	6189.488	0.018	3099	1390	0.587	0.263	607.0	577.3	29.7	50.602	0.10	0.08	4.71
PRV14	29,663,158	1.064	680.972	6870.460	0.050	11978	8327	2.269	1.577	1720.0	515.0	1205	531.174	0.59	0.50	30.08
PRV14a	154,487	0.006	3.547	6874.007	0.018	1775	720	0.336	0.136	585.4	570.2	15.2	45.215	0.06	0.05	2.86
PRV14b	289,448	0.010	6.645	6880.652	0.018	2114	534	0.400	0.101	625.0	563.4	61.6	153.854	0.05	0.03	2.04
Total Check	299,721,192	10.751														

Lag Equations from SD County Manual

Corps $T_1 = 24n((L \times L_c)/(s^{0.5}))^m$

NRCS $T_1 = T_p - 0.5D$

$T_p = 0.862 * \text{Corps } T_1$

HEC-HMS Routing Input-Proposed Conditions

Subarea	Reach	U/S Node	D/S Node	Length (ft)	U/S Elev (ft)	D/S Elev (ft)	Slope (ft/ft)	Slope (ft/mi)	"n" value	Channel Type	Dimensions
PRV01	R001	J001	J003	2189	868.0	818.0	0.02284	120.60302	0.05	Trap	50' (W), 3H:1V
PRV03	R002	J002	J003	2563	885.0	818.0	0.02614	138.02575	0.05	Trap	30' (W), 3H:1V
PRV04	R003	J003	J004	8460	818.0	618.0	0.02364	124.82270	0.05	Trap	30' (W), 3H:1V
PRV05, PRV06a	R012	J005a	J005b	1100	724.0	700.0	0.02182	115.20000	0.013	CIR	60"
PRV06b	R011	J005c	J005b	1802	765.0	700.0	0.03607	190.45505	0.013	CIR	42"
PRV06c	R004	J005b	J005	2638	700.0	620.0	0.03033	160.12130	0.013	CIR	72"
PRV04	R010	J005	J004	746	620.0	615.0	0.00670	35.38874	0.013	CIR	72"
PRV07	R005	J004	J006	2399	618.0	588.0	0.01251	66.02751	0.05	Trap	50' (W), 8H:1V
PRV12	R006	J006	J007	2125	588.0	568.0	0.00941	49.69412	0.05	Trap	50' (W), 8H:1V
PRV13	R007	J007	J008	1429	568.0	558.0	0.00700	36.94892	0.05	Trap	20' (W), 3H:1V
PRV14	R009	J008	J009	4448	558.0	515.0	0.00967	51.04317	0.05	Trap	20' (W), 3H:1V
PRV14a	B4-J009	Basin4	J009	2964	545.0	515.0	0.01012	53.44130	0.05	Trap	20' (W), 3H:1V
PRV14b	B5-J009	Basin5	J009	1918	540.0	515.0	0.01303	68.82169	0.05	Trap	20' (W), 3H:1V

OTAY RANCH VILLAGE 14

HEC HMS HYETOGRAPH CALCULATIONS

SD COUNTY HYETOGRAPH CALCULATIONS

Area	(sq ft)	(sq mi)	(ac)
PRV01	41508228	1.49	952.90
PRV02	44500468	1.60	1021.59
PRV03	34573628	1.24	793.70
PRV04	25842568	0.93	593.26
PRV05	3751898	0.13	86.13
PRV06a	10784981	0.39	247.59
PRV06b	3959006	0.14	90.89
PRV06c	9850377	0.35	226.13
PRV07	18080935	0.65	415.08
PRV08	36350516	1.30	834.49
PRV09	4570366	0.16	104.92
PRV10	17935965	0.64	411.75
PRV12	14057261	0.50	322.71
PRV13	3522997	0.13	80.88
PRV14	30107093	1.08	691.16
Total	299396287	10.74	6873.19

Rainfall Depth-Area Adjustment Data Points

Watershed area (sq mi)	30	60	180	360	1440	
10	0.9	0.947	0.97	0.98	0.985	Taken from Table 4-1
10.74	**0.895**	**0.944**	**0.969**	**0.979**	**0.984**	Interpolated
20	0.834	0.9	0.952	0.963	0.975	Taken from Table 4-1

P(6)= 3.1 in

RAINFALL DISTRIBUTION SORTED IN ORDER OF INCREASING DURATION

CALCULATED RAINFALL SORTED IN (2/3,1/3) DISTRIBUTION

Duration (min)	Rainfall Precipitation for Duration (in)	Depth Area Adjustment for Duration	Depth-Area Adjusted Precipitation (in)	Hyetograph Ordinate (in)		Sorted Hyetograph Ordinate (in)
5	0.681	0.895	0.609	0.609	1	0.010
10	0.871	0.895	0.779	0.170	2	0.010
15	1.005	0.895	0.900	0.121	3	0.010
20	1.113	0.895	0.997	0.097	4	0.011
25	1.205	0.895	1.079	0.082	5	0.011
30	1.286	0.895	1.151	0.072	6	0.011
35	1.358	0.903	1.227	0.076	7	0.011
40	1.424	0.911	1.298	0.071	8	0.011
45	1.485	0.919	1.365	0.067	9	0.011
50	1.541	0.927	1.429	0.064	10	0.011
55	1.594	0.935	1.492	0.062	11	0.011
60	1.644	0.944	1.552	0.060	12	0.011
65	1.692	0.945	1.598	0.046	13	0.011
70	1.737	0.946	1.643	0.044	14	0.011
75	1.780	0.947	1.685	0.043	15	0.011
80	1.821	0.948	1.726	0.041	16	0.011
85	1.861	0.949	1.766	0.040	17	0.011
90	1.899	0.950	1.804	0.038	18	0.011
95	1.936	0.951	1.841	0.037	19	0.011
100	1.971	0.952	1.877	0.036	20	0.011
105	2.006	0.953	1.912	0.035	21	0.011
110	2.039	0.954	1.945	0.034	22	0.011
115	2.072	0.955	1.979	0.033	23	0.011
120	2.103	0.956	2.011	0.032	24	0.011
125	2.134	0.957	2.043	0.032	25	0.011
130	2.164	0.958	2.073	0.031	26	0.011
135	2.193	0.959	2.104	0.030	27	0.011
140	2.222	0.960	2.133	0.030	28	0.011
145	2.249	0.961	2.162	0.029	29	0.011
150	2.277	0.962	2.191	0.029	30	0.011
155	2.303	0.963	2.219	0.028	31	0.011
160	2.329	0.964	2.247	0.028	32	0.011
165	2.355	0.966	2.274	0.027	33	0.011
170	2.380	0.967	2.301	0.027	34	0.011
175	2.405	0.968	2.327	0.026	35	0.011

OTAY RANCH VILLAGE 14

HEC HMS HYETOGRAPH CALCULATIONS

180	2.429	0.969	2.353	0.026	36	0.012
185	2.453	0.969	2.376	0.024	37	0.012
190	2.476	0.969	2.400	0.023	38	0.012
195	2.499	0.970	2.423	0.023	39	0.012
200	2.521	0.970	2.445	0.023	40	0.012
205	2.544	0.970	2.468	0.022	41	0.012
210	2.565	0.970	2.489	0.022	42	0.012
215	2.587	0.971	2.511	0.022	43	0.012
220	2.608	0.971	2.532	0.021	44	0.012
225	2.629	0.971	2.553	0.021	45	0.012
230	2.650	0.971	2.574	0.021	46	0.012
235	2.670	0.972	2.595	0.020	47	0.012
240	2.690	0.972	2.615	0.020	48	0.012
245	2.710	0.972	2.635	0.020	49	0.012
250	2.729	0.973	2.654	0.020	50	0.012
255	2.749	0.973	2.674	0.019	51	0.012
260	2.768	0.973	2.693	0.019	52	0.012
265	2.786	0.973	2.712	0.019	53	0.012
270	2.805	0.974	2.731	0.019	54	0.012
275	2.823	0.974	2.750	0.019	55	0.012
280	2.841	0.974	2.768	0.018	56	0.012
285	2.859	0.975	2.786	0.018	57	0.012
290	2.877	0.975	2.805	0.018	58	0.012
295	2.894	0.975	2.822	0.018	59	0.012
300	2.912	0.975	2.840	0.018	60	0.012
305	2.929	0.976	2.858	0.018	61	0.013
310	2.946	0.976	2.875	0.017	62	0.013
315	2.963	0.976	2.892	0.017	63	0.013
320	2.979	0.977	2.909	0.017	64	0.013
325	2.996	0.977	2.926	0.017	65	0.013
330	3.012	0.977	2.943	0.017	66	0.013
335	3.028	0.977	2.960	0.017	67	0.013
340	3.044	0.978	2.976	0.016	68	0.013
345	3.060	0.978	2.992	0.016	69	0.013
350	3.076	0.978	3.008	0.016	70	0.013
355	3.091	0.978	3.025	0.016	71	0.013
360	3.106	0.979	3.040	0.016	72	0.013
365	3.021	0.979	2.957	0.018	73	0.013
370	3.041	0.979	2.977	0.020	74	0.013
375	3.062	0.979	2.997	0.020	75	0.013
380	3.082	0.979	3.017	0.020	76	0.013
385	3.102	0.979	3.037	0.020	77	0.013
390	3.122	0.979	3.057	0.020	78	0.013
395	3.142	0.979	3.076	0.020	79	0.013
400	3.162	0.979	3.096	0.019	80	0.014
405	3.182	0.979	3.115	0.019	81	0.014
410	3.202	0.979	3.134	0.019	82	0.014
415	3.221	0.979	3.153	0.019	83	0.014
420	3.240	0.979	3.172	0.019	84	0.014
425	3.260	0.979	3.191	0.019	85	0.014
430	3.279	0.979	3.210	0.019	86	0.014
435	3.298	0.979	3.229	0.019	87	0.014
440	3.317	0.979	3.247	0.019	88	0.014
445	3.335	0.979	3.266	0.018	89	0.014
450	3.354	0.979	3.284	0.018	90	0.014
455	3.373	0.979	3.303	0.018	91	0.014
460	3.391	0.979	3.321	0.018	92	0.014
465	3.410	0.979	3.339	0.018	93	0.014
470	3.428	0.979	3.357	0.018	94	0.014
475	3.446	0.979	3.375	0.018	95	0.014
480	3.464	0.979	3.393	0.018	96	0.015
485	3.482	0.979	3.410	0.018	97	0.015
490	3.500	0.979	3.428	0.018	98	0.015
495	3.518	0.979	3.445	0.018	99	0.015
500	3.536	0.979	3.463	0.017	100	0.015
505	3.553	0.979	3.480	0.017	101	0.015
510	3.571	0.980	3.498	0.017	102	0.015
515	3.588	0.980	3.515	0.017	103	0.015
520	3.606	0.980	3.532	0.017	104	0.015

525	3.623	0.980	3.549	0.017	105	0.015
530	3.640	0.980	3.566	0.017	106	0.015
535	3.657	0.980	3.583	0.017	107	0.015
540	3.674	0.980	3.600	0.017	108	0.016
545	3.691	0.980	3.616	0.017	109	0.016
550	3.708	0.980	3.633	0.017	110	0.016
555	3.725	0.980	3.649	0.017	111	0.016
560	3.742	0.980	3.666	0.016	112	0.016
565	3.758	0.980	3.682	0.016	113	0.016
570	3.775	0.980	3.699	0.016	114	0.016
575	3.791	0.980	3.715	0.016	115	0.016
580	3.808	0.980	3.731	0.016	116	0.016
585	3.824	0.980	3.747	0.016	117	0.016
590	3.841	0.980	3.763	0.016	118	0.017
595	3.857	0.980	3.779	0.016	119	0.017
600	3.873	0.980	3.795	0.016	120	0.017
605	3.889	0.980	3.811	0.016	121	0.017
610	3.905	0.980	3.827	0.016	122	0.017
615	3.921	0.980	3.843	0.016	123	0.017
620	3.937	0.980	3.859	0.016	124	0.017
625	3.953	0.980	3.874	0.016	125	0.017
630	3.969	0.980	3.890	0.016	126	0.018
635	3.984	0.980	3.905	0.016	127	0.018
640	4.000	0.980	3.921	0.015	128	0.018
645	4.016	0.980	3.936	0.015	129	0.018
650	4.031	0.980	3.951	0.015	130	0.018
655	4.047	0.980	3.967	0.015	131	0.018
660	4.062	0.980	3.982	0.015	132	0.018
665	4.077	0.980	3.997	0.015	133	0.018
670	4.093	0.980	4.012	0.015	134	0.019
675	4.108	0.980	4.027	0.015	135	0.019
680	4.123	0.980	4.042	0.015	136	0.019
685	4.138	0.980	4.057	0.015	137	0.019
690	4.153	0.980	4.072	0.015	138	0.019
695	4.168	0.980	4.087	0.015	139	0.019
700	4.183	0.980	4.102	0.015	140	0.020
705	4.198	0.981	4.116	0.015	141	0.020
710	4.213	0.981	4.131	0.015	142	0.020
715	4.228	0.981	4.146	0.015	143	0.020
720	4.243	0.981	4.160	0.015	144	0.016
725	4.257	0.981	4.175	0.015	145	0.016
730	4.272	0.981	4.189	0.014	146	0.016
735	4.287	0.981	4.204	0.014	147	0.016
740	4.301	0.981	4.218	0.014	148	0.017
745	4.316	0.981	4.232	0.014	149	0.017
750	4.330	0.981	4.247	0.014	150	0.017
755	4.345	0.981	4.261	0.014	151	0.017
760	4.359	0.981	4.275	0.014	152	0.018
765	4.373	0.981	4.289	0.014	153	0.018
770	4.387	0.981	4.303	0.014	154	0.018
775	4.402	0.981	4.317	0.014	155	0.018
780	4.416	0.981	4.331	0.014	156	0.019
785	4.430	0.981	4.345	0.014	157	0.019
790	4.444	0.981	4.359	0.014	158	0.019
795	4.458	0.981	4.373	0.014	159	0.020
800	4.472	0.981	4.387	0.014	160	0.020
805	4.486	0.981	4.401	0.014	161	0.020
810	4.500	0.981	4.415	0.014	162	0.021
815	4.514	0.981	4.428	0.014	163	0.021
820	4.528	0.981	4.442	0.014	164	0.022
825	4.541	0.981	4.456	0.014	165	0.022
830	4.555	0.981	4.469	0.014	166	0.023
835	4.569	0.981	4.483	0.014	167	0.023
840	4.583	0.981	4.496	0.014	168	0.026
845	4.596	0.981	4.510	0.013	169	0.026
850	4.610	0.981	4.523	0.013	170	0.027
855	4.623	0.981	4.537	0.013	171	0.028
860	4.637	0.981	4.550	0.013	172	0.029
865	4.650	0.981	4.563	0.013	173	0.029

OTAY RANCH VILLAGE 14

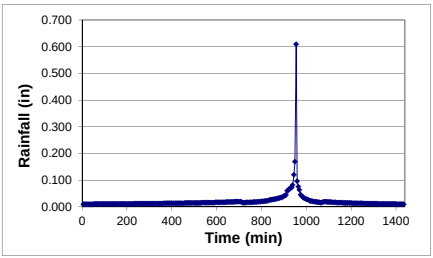
HEC HMS HYETOGRAPH CALCULATIONS

870	4.664	0.981	4.577	0.013	174	0.030
875	4.677	0.981	4.590	0.013	175	0.031
880	4.690	0.981	4.603	0.013	176	0.032
885	4.704	0.981	4.616	0.013	177	0.033
890	4.717	0.981	4.629	0.013	178	0.035
895	4.730	0.981	4.643	0.013	179	0.036
900	4.743	0.982	4.656	0.013	180	0.038
905	4.757	0.982	4.669	0.013	181	0.040
910	4.770	0.982	4.682	0.013	182	0.043
915	4.783	0.982	4.695	0.013	183	0.044
920	4.796	0.982	4.708	0.013	184	0.060
925	4.809	0.982	4.721	0.013	185	0.062
930	4.822	0.982	4.733	0.013	186	0.067
935	4.835	0.982	4.746	0.013	187	0.071
940	4.848	0.982	4.759	0.013	188	0.072
945	4.861	0.982	4.772	0.013	189	0.082
950	4.873	0.982	4.784	0.013	190	0.121
955	4.886	0.982	4.797	0.013	191	0.170
960	4.899	0.982	4.810	0.013	192	0.609
965	4.912	0.982	4.822	0.013	193	0.097
970	4.924	0.982	4.835	0.013	194	0.076
975	4.937	0.982	4.848	0.013	195	0.064
980	4.950	0.982	4.860	0.013	196	0.046
985	4.962	0.982	4.873	0.013	197	0.041
990	4.975	0.982	4.885	0.012	198	0.037
995	4.987	0.982	4.898	0.012	199	0.034
1000	5.000	0.982	4.910	0.012	200	0.032
1005	5.012	0.982	4.922	0.012	201	0.030
1010	5.025	0.982	4.935	0.012	202	0.028
1015	5.037	0.982	4.947	0.012	203	0.027
1020	5.050	0.982	4.959	0.012	204	0.024
1025	5.062	0.982	4.972	0.012	205	0.023
1030	5.074	0.982	4.984	0.012	206	0.022
1035	5.087	0.982	4.996	0.012	207	0.021
1040	5.099	0.982	5.008	0.012	208	0.020
1045	5.111	0.982	5.020	0.012	209	0.019
1050	5.123	0.982	5.033	0.012	210	0.019
1055	5.136	0.982	5.045	0.012	211	0.018
1060	5.148	0.982	5.057	0.012	212	0.018
1065	5.160	0.982	5.069	0.012	213	0.017
1070	5.172	0.982	5.081	0.012	214	0.017
1075	5.184	0.982	5.093	0.012	215	0.016
1080	5.196	0.982	5.105	0.012	216	0.018
1085	5.208	0.982	5.117	0.012	217	0.020
1090	5.220	0.982	5.129	0.012	218	0.020
1095	5.232	0.982	5.141	0.012	219	0.019
1100	5.244	0.983	5.152	0.012	220	0.019
1105	5.256	0.983	5.164	0.012	221	0.019
1110	5.268	0.983	5.176	0.012	222	0.018
1115	5.280	0.983	5.188	0.012	223	0.018
1120	5.292	0.983	5.200	0.012	224	0.018
1125	5.303	0.983	5.211	0.012	225	0.017
1130	5.315	0.983	5.223	0.012	226	0.017
1135	5.327	0.983	5.235	0.012	227	0.017
1140	5.339	0.983	5.246	0.012	228	0.017
1145	5.350	0.983	5.258	0.012	229	0.016
1150	5.362	0.983	5.270	0.012	230	0.016
1155	5.374	0.983	5.281	0.012	231	0.016
1160	5.385	0.983	5.293	0.012	232	0.016
1165	5.397	0.983	5.304	0.012	233	0.016
1170	5.408	0.983	5.316	0.012	234	0.016
1175	5.420	0.983	5.327	0.011	235	0.015
1180	5.431	0.983	5.339	0.011	236	0.015
1185	5.443	0.983	5.350	0.011	237	0.015
1190	5.454	0.983	5.362	0.011	238	0.015
1195	5.466	0.983	5.373	0.011	239	0.015
1200	5.477	0.983	5.384	0.011	240	0.015
1205	5.489	0.983	5.396	0.011	241	0.014
1210	5.500	0.983	5.407	0.011	242	0.014

OTAY RANCH VILLAGE 14

HEC HMS HYETOGRAPH CALCULATIONS

1215	5.511	0.983	5.418	0.011	243	0.014
1220	5.523	0.983	5.430	0.011	244	0.014
1225	5.534	0.983	5.441	0.011	245	0.014
1230	5.545	0.983	5.452	0.011	246	0.014
1235	5.557	0.983	5.463	0.011	247	0.014
1240	5.568	0.983	5.474	0.011	248	0.013
1245	5.579	0.983	5.486	0.011	249	0.013
1250	5.590	0.983	5.497	0.011	250	0.013
1255	5.601	0.983	5.508	0.011	251	0.013
1260	5.612	0.983	5.519	0.011	252	0.013
1265	5.624	0.983	5.530	0.011	253	0.013
1270	5.635	0.983	5.541	0.011	254	0.013
1275	5.646	0.983	5.552	0.011	255	0.013
1280	5.657	0.983	5.563	0.011	256	0.013
1285	5.668	0.983	5.574	0.011	257	0.013
1290	5.679	0.983	5.585	0.011	258	0.012
1295	5.690	0.984	5.596	0.011	259	0.012
1300	5.701	0.984	5.607	0.011	260	0.012
1305	5.712	0.984	5.618	0.011	261	0.012
1310	5.723	0.984	5.629	0.011	262	0.012
1315	5.734	0.984	5.640	0.011	263	0.012
1320	5.745	0.984	5.651	0.011	264	0.012
1325	5.755	0.984	5.661	0.011	265	0.012
1330	5.766	0.984	5.672	0.011	266	0.012
1335	5.777	0.984	5.683	0.011	267	0.012
1340	5.788	0.984	5.694	0.011	268	0.012
1345	5.799	0.984	5.705	0.011	269	0.012
1350	5.809	0.984	5.715	0.011	270	0.011
1355	5.820	0.984	5.726	0.011	271	0.011
1360	5.831	0.984	5.737	0.011	272	0.011
1365	5.842	0.984	5.747	0.011	273	0.011
1370	5.852	0.984	5.758	0.011	274	0.011
1375	5.863	0.984	5.769	0.011	275	0.011
1380	5.874	0.984	5.779	0.011	276	0.011
1385	5.884	0.984	5.790	0.011	277	0.011
1390	5.895	0.984	5.801	0.011	278	0.011
1395	5.906	0.984	5.811	0.011	279	0.011
1400	5.916	0.984	5.822	0.011	280	0.011
1405	5.927	0.984	5.832	0.011	281	0.011
1410	5.937	0.984	5.843	0.011	282	0.011
1415	5.948	0.984	5.853	0.011	283	0.011
1420	5.958	0.984	5.864	0.010	284	0.011
1425	5.969	0.984	5.874	0.010	285	0.011
1430	5.979	0.984	5.885	0.010	286	0.011
1435	5.990	0.984	5.895	0.010	287	0.010
1440	6.000	0.984	5.906	0.010	288	0.010
						6.007



CHAPTER 4

4.2 – Proposed Condition Hydrology Map (HEC HMS)

600 0 600 1200 1800

SCALE 1" = 600'

PRV01
943.13 acres

PRV02
1,023.65 acres

PRV01a
12.65 acres

CULVERT CROSSING
Q100 = 1,523 cfs
A = 1.47 sqmi
Tpeak = 16:25

BASIN10

J001
Q100 = 1,536 cfs
A = 1.49 sqmi
Tpeak = 16:25

PROCTOR VALLEY ROAD

PRV02a
2.10 acres

BASIN8

J003
Q100 = 4,861 cfs
A = 4.33 sqmi
Tpeak = 16:20

CULVERT CROSSING
J002
Q100 = 1,466 cfs
A = 1.24 sqmi
Tpeak = 16:20

PRV03
793.70 acres

PRV05
86.13 acres

PRV04
593.26 acres

PRV06a
247.59 acres

J005a
Q100 = 864 cfs
A = 0.52 sqmi
Tpeak = 16:10

BASIN6

Q100 = 327 cfs

J005b
Q100 = 1,137 cfs
A = 0.66 sqmi
Tpeak = 16:05

J005c

PRV06b
90.88 acres

PRV07
415.08 acres

PRV06c
226.54 acres

BASIN1

PRV05

J005
Q100 = 1,793 cfs
A = 1.02 sqmi
Tpeak = 16:10

J004
Q100 = 6,755 cfs
A = 6.28 sqmi
Tpeak = 16:20

PRV09
104.92 acres

PRV12
322.71 acres

CULVERT CROSSING
J006
Q100 = 1,515 cfs
A = 1.30 sqmi
Tpeak = 16:22

J006
Q100 = 8,994 cfs
A = 8.23 sqmi
Tpeak = 16:25

PRV08
834.49 acres

BASIN2

PRV013
74.78 acres

PROCTOR VALLEY ROAD

J007
Q100 = 10,474 cfs
A = 9.54 sqmi
Tpeak = 16:25

CULVERT CROSSING
J007
Q100 = 807 cfs
A = 0.64 sqmi
Tpeak = 16:20

PRV10
411.7 acres

BRIDGE CROSSING
J008
Q100 = 10,431 cfs
A = 9.67 sqmi
Tpeak = 16:25

BASIN3

PRV013a
6.11 acres

PRV014a
3.55 acres

PRV014b
6.64 acres

BASIN4

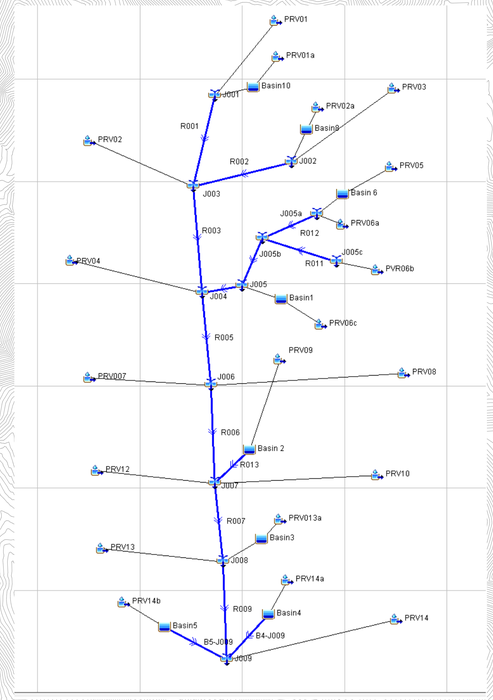
PVR3
CULVERT CROSSING
Q100 = 1,425.3 cfs
A = 797.9 AC
Tc = 22:42

PRV14
680.97 acres

BASIN5

PROCTOR VALLEY ROAD

J009
Q100 = 11,501 cfs



LEGEND:

PRVxx
xx.xx acres — DRAINAGE AREA

SUBAREA BOUNDARY

PREPARED BY:

HUNSAKER & ASSOCIATES
SAN DIEGO, INC

PLANNING 9707 Waples Street
ENGINEERING San Diego, Ca. 92121
SURVEYING PH(858)558-4500 · FX(858)558-1414

EXHIBIT 4.1
PROPOSED CONDITION HEC-HMS HYDROLOGY MAP
OTAY RANCH VILLAGE14 & PA 16/19
PROPOSED PROJECT AMENDMENT
COUNTY OF SAN DIEGO, CALIFORNIA

W.O.# 2167-0127

R: \1235\Hyd\ACAD\HYDRO\TM-SRP\1235- HEC HMS V14- PR-SRP-NEW-W-ALL-BASINS.dwg[ ]Nov-05-2019: 10: 55

CHAPTER 5

Rational Method Hydrologic Model for Proposed Condition

AES ZONE 1

AES ZONE 1

AES ZONE 2

AES ZONE 3

AES ZONE 4

PREPARED BY:

HUNSAKER & ASSOCIATES SAN DIEGO, INC

PLANNING 9707 Waples Street
ENGINEERING San Diego, Ca 92121
SURVEYING PH(858)558-4500 FX(858)558-1414

PROPOSED CONDITION AES ZONE MAP

OTAY RANCH
VILLAGE 14 & PA 16/19
PROPOSED PROJECT AMENDMENT

COUNTY OF SAN DIEGO, CALIFORNIA

SHEET 1 OF 1

W.O.# 3087-0002

R:\1235\Hyd\ACAD\HYDRO\TM-SRP\1235- HYDRO V14- PROP-SRP-NEW.dwg[]Sep-10-2019:18:10

CHAPTER 5

5.1.1 – Rational Method Hydrologic Analysis (AES 2015)

AES Zone 1

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

          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                       2003,1985,1981 HYDROLOGY MANUAL
       (c) Copyright 1982-2015 Advanced Engineering Software (aes)
           Ver. 22.0 Release Date: 07/01/2015  License ID 1239

                       Analysis prepared by:




------------------------------------------------------------------------
  FILE NAME: R:\1235\HYD\CALCS\AES\SRP\ATT\ZONE1.DAT
  TIME/DATE OF STUDY: 15:03 11/05/2019
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.100
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *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   20.0      10.0    0.020/0.020/0.020   0.50    1.50 0.0312 0.125 0.0150
  2   20.0      10.0    0.020/0.020/0.020   0.50    1.50 0.0312 0.125 0.0150
  3   20.0      10.0    0.020/0.020/0.020   0.50    1.50 0.0312 0.125 0.0150
  4   20.0      10.0    0.020/0.020/0.020   0.50    1.50 0.0312 0.125 0.0150
  5   20.0      10.0    0.020/0.020/0.020   0.50    1.50 0.0312 0.125 0.0150
  6   20.0      10.0    0.020/0.020/0.020   0.50    1.50 0.0312 0.125 0.0150
  7   16.0       8.0    0.020/0.020/0.020   0.50    1.50 0.0312 0.125 0.0150
  8   20.0      10.0    0.020/0.020/0.020   0.50    1.50 0.0312 0.125 0.0150
  9   18.0       9.0    0.020/0.020/0.020   0.50    1.50 0.0312 0.125 0.0150
 10   17.0      10.0    0.020/0.020/0.020   0.50    1.50 0.0312 0.125 0.0150
 11   14.0       7.0    0.020/0.020/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
```



```
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

+----------------------------------------------------------------------+
| BEGIN ZONE 1 HYD                                                     |
| BASIN 10 HYD                                                         |
|                                                                      |
+----------------------------------------------------------------------+

************************************************************************
  FLOW PROCESS FROM NODE    260.00 TO NODE    261.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =  86
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1430.00
  DOWNSTREAM ELEVATION(FEET) =   1420.00
  ELEVATION DIFFERENCE(FEET) =     10.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.061
  SUBAREA RUNOFF(CFS) =      0.54
  TOTAL AREA(ACRES) =      0.22   TOTAL RUNOFF(CFS) =      0.54

************************************************************************
  FLOW PROCESS FROM NODE    261.00 TO NODE    262.00 IS CODE =  52
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1420.00  DOWNSTREAM(FEET) =    890.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  4480.00   CHANNEL SLOPE =  0.1183
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.54
  FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  15.74   Tc(MIN.) =   22.01
  LONGEST FLOWPATH FROM NODE    260.00 TO NODE    262.00 =    4580.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    261.00 TO NODE    262.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.140
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =  86
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =  180.52   SUBAREA RUNOFF(CFS) =  198.41
  TOTAL AREA(ACRES) =      180.7   TOTAL RUNOFF(CFS) =     198.65
  TC(MIN.) =   22.01

****************************************************************************
  FLOW PROCESS FROM NODE    265.00 TO NODE    266.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =  86
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    988.00
  DOWNSTREAM ELEVATION(FEET) =    980.00
  ELEVATION DIFFERENCE(FEET) =      8.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.750
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.730
  SUBAREA RUNOFF(CFS) =      0.92
  TOTAL AREA(ACRES) =      0.39   TOTAL RUNOFF(CFS) =      0.92

****************************************************************************
  FLOW PROCESS FROM NODE    266.00 TO NODE    267.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    980.00  DOWNSTREAM(FEET) =    900.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1124.00   CHANNEL SLOPE =  0.0712
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.92
  FLOW VELOCITY(FEET/SEC) =   4.00 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.68   Tc(MIN.) =   11.43
  LONGEST FLOWPATH FROM NODE    265.00 TO NODE    267.00 =    1224.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    266.00 TO NODE    267.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.791
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =  86
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   11.84   SUBAREA RUNOFF(CFS) =   19.86
  TOTAL AREA(ACRES) =       12.2   TOTAL RUNOFF(CFS) =      20.51
  TC(MIN.) =   11.43

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



```
  FLOW PROCESS FROM NODE    267.00 TO NODE    268.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   985.00  DOWNSTREAM(FEET) =   980.00
  FLOW LENGTH(FEET) =   674.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.25
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      20.51
  PIPE TRAVEL TIME(MIN.) =   1.55    Tc(MIN.) =   12.98
  LONGEST FLOWPATH FROM NODE    265.00 TO NODE    268.00 =    1898.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    235.00 TO NODE    236.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (4.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5200
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  86
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    65.00
  UPSTREAM ELEVATION(FEET) =    913.65
  DOWNSTREAM ELEVATION(FEET) =    913.00
  ELEVATION DIFFERENCE(FEET) =      0.65
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.417
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.837
  SUBAREA RUNOFF(CFS) =      1.24
  TOTAL AREA(ACRES) =      0.41   TOTAL RUNOFF(CFS) =      1.24

****************************************************************************
  FLOW PROCESS FROM NODE    236.00 TO NODE    237.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION # 11 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  913.00  DOWNSTREAM ELEVATION(FEET) =  898.00
  STREET LENGTH(FEET) =  1269.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 14.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   7.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.53
```

```
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =   12.06
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.71
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.00
  STREET FLOW TRAVEL TIME(MIN.) =   7.79   Tc(MIN.) =   16.21
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.825
  RESIDENTIAL (4.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5200
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  86
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.520
  SUBAREA AREA(ACRES) =    7.15      SUBAREA RUNOFF(CFS) =   14.22
  TOTAL AREA(ACRES) =        7.6        PEAK FLOW RATE(CFS) =      15.04

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  14.00
  FLOW VELOCITY(FEET/SEC.) =  3.21   DEPTH*VELOCITY(FT*FT/SEC.) =   1.36
  LONGEST FLOWPATH FROM NODE    235.00 TO NODE    237.00 =    1334.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    237.00 TO NODE    233.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   898.00  DOWNSTREAM(FEET) =   897.10
  FLOW LENGTH(FEET) =    43.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.97
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      15.04
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   16.28
  LONGEST FLOWPATH FROM NODE    235.00 TO NODE    233.00 =    1377.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    233.00 TO NODE    233.00 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.) =   16.28
  RAINFALL INTENSITY(INCH/HR) =   3.81
  TOTAL STREAM AREA(ACRES) =     7.56
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     15.04

****************************************************************************
  FLOW PROCESS FROM NODE    231.00 TO NODE    232.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
```



```
  RESIDENTIAL (4.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5200
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  86
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    65.00
  UPSTREAM ELEVATION(FEET) =    908.65
  DOWNSTREAM ELEVATION(FEET) =    908.00
  ELEVATION DIFFERENCE(FEET) =      0.65
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.417
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.837
  SUBAREA RUNOFF(CFS) =      1.64
  TOTAL AREA(ACRES) =      0.54   TOTAL RUNOFF(CFS) =      1.64

****************************************************************************
  FLOW PROCESS FROM NODE    232.00 TO NODE    233.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION # 11 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  908.00  DOWNSTREAM ELEVATION(FEET) =  898.00
  STREET LENGTH(FEET) =   838.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 14.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   7.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.89
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =    9.54
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.38
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.75
  STREET FLOW TRAVEL TIME(MIN.) =   5.87   Tc(MIN.) =   14.29
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.149
  RESIDENTIAL (4.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5200
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  86
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.520
  SUBAREA AREA(ACRES) =    2.97      SUBAREA RUNOFF(CFS) =    6.41
  TOTAL AREA(ACRES) =        3.5        PEAK FLOW RATE(CFS) =       7.57

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  11.46
  FLOW VELOCITY(FEET/SEC.) =  2.65   DEPTH*VELOCITY(FT*FT/SEC.) =   0.94
  LONGEST FLOWPATH FROM NODE    231.00 TO NODE    233.00 =     903.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    233.00 TO NODE    233.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   14.29
  RAINFALL INTENSITY(INCH/HR) =   4.15
  TOTAL STREAM AREA(ACRES) =     3.51
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.57

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       15.04    16.28        3.814          7.56
      2        7.57    14.29        4.149          3.51

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF       Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       20.77    14.29       4.149
      2       22.00    16.28       3.814

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      22.00   Tc(MIN.) =   16.28
  TOTAL AREA(ACRES) =       11.1
  LONGEST FLOWPATH FROM NODE    235.00 TO NODE    233.00 =    1377.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    233.00 TO NODE     10.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   888.00  DOWNSTREAM(FEET) =   880.00
  FLOW LENGTH(FEET) =   195.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.08
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      22.00
  PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   16.51
  LONGEST FLOWPATH FROM NODE    235.00 TO NODE     10.00 =    1572.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    233.00 TO NODE     10.00 IS CODE =  81
----------------------------------------------------------------------------
```



```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.779
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =  86
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.4969
  SUBAREA AREA(ACRES) =    1.74   SUBAREA RUNOFF(CFS) =    2.30
  TOTAL AREA(ACRES) =       12.8   TOTAL RUNOFF(CFS) =      24.06
  TC(MIN.) =   16.51

+--------------------------------------------------------------------------+
| END BASIN 10 HYD                                                         |
| APPLY CODE 7 IN BASIN 10 FOR ATTENUATED OUTFLOW                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     10.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  31.51   RAIN INTENSITY(INCH/HOUR) =  2.49
  TOTAL AREA(ACRES) =    12.80   TOTAL RUNOFF(CFS) =      4.20

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE      9.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   880.00  DOWNSTREAM(FEET) =   879.00
  FLOW LENGTH(FEET) =   296.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.65
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.20
  PIPE TRAVEL TIME(MIN.) =   1.35    Tc(MIN.) =   32.86
  LONGEST FLOWPATH FROM NODE    235.00 TO NODE      9.00 =    1868.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   32.86
  RAINFALL INTENSITY(INCH/HR) =   2.42
  TOTAL STREAM AREA(ACRES) =    12.80
```

```
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.20

****************************************************************************
 FLOW PROCESS FROM NODE    245.00 TO NODE    246.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .7900
 S.C.S. CURVE NUMBER (AMC II) =  86
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
 UPSTREAM ELEVATION(FEET) =    914.00
 DOWNSTREAM ELEVATION(FEET) =    912.00
 ELEVATION DIFFERENCE(FEET) =      2.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.290
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.168
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.97
 TOTAL AREA(ACRES) =      0.15   TOTAL RUNOFF(CFS) =      0.97

****************************************************************************
 FLOW PROCESS FROM NODE    246.00 TO NODE      9.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION # 10 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  912.00  DOWNSTREAM ELEVATION(FEET) =  883.00
 STREET LENGTH(FEET) =   879.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 17.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.91
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.30
   HALFSTREET FLOOD WIDTH(FEET) =    8.84
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.84
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.16
 STREET FLOW TRAVEL TIME(MIN.) =   3.81   Tc(MIN.) =    7.10
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.513
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .7900
 S.C.S. CURVE NUMBER (AMC II) =  86
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.790
```



```
 SUBAREA AREA(ACRES) =    2.28      SUBAREA RUNOFF(CFS) =   11.73
 TOTAL AREA(ACRES) =        2.4        PEAK FLOW RATE(CFS) =      12.50

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  11.41
 FLOW VELOCITY(FEET/SEC.) =  4.40   DEPTH*VELOCITY(FT*FT/SEC.) =   1.56
 LONGEST FLOWPATH FROM NODE    245.00 TO NODE      9.00 =     949.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    7.10
 RAINFALL INTENSITY(INCH/HR) =   6.51
 TOTAL STREAM AREA(ACRES) =     2.43
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     12.50

****************************************************************************
 FLOW PROCESS FROM NODE    250.00 TO NODE    251.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =  86
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    975.00
 DOWNSTREAM ELEVATION(FEET) =    970.00
 ELEVATION DIFFERENCE(FEET) =      5.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.895
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.083
 SUBAREA RUNOFF(CFS) =      1.00
 TOTAL AREA(ACRES) =      0.47   TOTAL RUNOFF(CFS) =      1.00

****************************************************************************
 FLOW PROCESS FROM NODE    251.00 TO NODE      9.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    970.00  DOWNSTREAM(FEET) =    885.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1090.00   CHANNEL SLOPE =  0.0780
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .0780 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =       1.00
 FLOW VELOCITY(FEET/SEC) =   1.56 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =  11.61   Tc(MIN.) =   19.51
 LONGEST FLOWPATH FROM NODE    250.00 TO NODE      9.00 =    1190.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    251.00 TO NODE      9.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.394
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =  86
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   16.28   SUBAREA RUNOFF(CFS) =   19.34
  TOTAL AREA(ACRES) =       16.8   TOTAL RUNOFF(CFS) =      19.90
  TC(MIN.) =   19.51

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE      9.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =   19.51
  RAINFALL INTENSITY(INCH/HR) =   3.39
  TOTAL STREAM AREA(ACRES) =    16.75
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     19.90

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        4.20    32.86        2.425         12.80
      2       12.50     7.10        6.513          2.43
      3       19.90    19.51        3.394         16.75

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       20.65     7.10       6.513
      2       28.91    19.51       3.394
      3       23.07    32.86       2.425

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      28.91   Tc(MIN.) =   19.51
  TOTAL AREA(ACRES) =       32.0
  LONGEST FLOWPATH FROM NODE    235.00 TO NODE      9.00 =    1868.00 FEET.

+----------------------------------------------------------------------------+
```



```
| BEGIN OFFSITE FLOW                                                         |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    255.00 TO NODE    256.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =  86
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    975.00
  DOWNSTREAM ELEVATION(FEET) =    970.00
  ELEVATION DIFFERENCE(FEET) =      5.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.895
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.083
  SUBAREA RUNOFF(CFS) =      1.23
  TOTAL AREA(ACRES) =      0.58   TOTAL RUNOFF(CFS) =      1.23

****************************************************************************
  FLOW PROCESS FROM NODE    256.00 TO NODE    257.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    970.00  DOWNSTREAM(FEET) =    910.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1010.00   CHANNEL SLOPE =  0.0594
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0594 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.23
  FLOW VELOCITY(FEET/SEC) =   1.46 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  11.50   Tc(MIN.) =   19.39
  LONGEST FLOWPATH FROM NODE    255.00 TO NODE    257.00 =    1110.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    256.00 TO NODE    257.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.407
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =  86
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   17.47   SUBAREA RUNOFF(CFS) =   20.83
  TOTAL AREA(ACRES) =       18.0   TOTAL RUNOFF(CFS) =      21.53
  TC(MIN.) =   19.39
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    257.00 TO NODE    258.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   910.00  DOWNSTREAM(FEET) =   905.00
  FLOW LENGTH(FEET) =   300.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.96
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      21.53
  PIPE TRAVEL TIME(MIN.) =   0.50    Tc(MIN.) =   19.89
  LONGEST FLOWPATH FROM NODE    255.00 TO NODE    258.00 =    1410.00 FEET.

+--------------------------------------------------------------------------+
| END OFFSITE FLOW                                                         |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    260.00 TO NODE    261.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =  86
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    85.00
  UPSTREAM ELEVATION(FEET) =    917.50
  DOWNSTREAM ELEVATION(FEET) =    916.00
  ELEVATION DIFFERENCE(FEET) =      1.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.168
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    81.47
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.168
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.65
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.65

****************************************************************************
  FLOW PROCESS FROM NODE    261.00 TO NODE    262.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION # 10 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  916.00  DOWNSTREAM ELEVATION(FEET) =  909.30
  STREET LENGTH(FEET) =   560.00   CURB HEIGHT(INCHES) =  6.0
```



```
  STREET HALFWIDTH(FEET) = 17.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.56
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    7.04
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.09
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.56
  STREET FLOW TRAVEL TIME(MIN.) =   4.47   Tc(MIN.) =    8.64
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.739
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .7900
  S.C.S. CURVE NUMBER (AMC II) =  86
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.790
  SUBAREA AREA(ACRES) =    0.83      SUBAREA RUNOFF(CFS) =    3.76
  TOTAL AREA(ACRES) =        0.9        PEAK FLOW RATE(CFS) =       4.22

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =   8.91
  FLOW VELOCITY(FEET/SEC.) =  2.31   DEPTH*VELOCITY(FT*FT/SEC.) =   0.70
  LONGEST FLOWPATH FROM NODE    260.00 TO NODE    262.00 =     645.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    262.00 TO NODE      8.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   899.30  DOWNSTREAM(FEET) =   896.00
  FLOW LENGTH(FEET) =   722.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.11
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       4.22
  PIPE TRAVEL TIME(MIN.) =   2.93    Tc(MIN.) =   11.57
  LONGEST FLOWPATH FROM NODE    260.00 TO NODE      8.00 =    1367.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    262.00 TO NODE      8.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.754
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =  86
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5458
 SUBAREA AREA(ACRES) =    1.16   SUBAREA RUNOFF(CFS) =    1.93
 TOTAL AREA(ACRES) =        2.1   TOTAL RUNOFF(CFS) =       5.42
 TC(MIN.) =   11.57

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      8.00 IS CODE =   7
----------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  91.57   RAIN INTENSITY(INCH/HOUR) =  1.25
 TOTAL AREA(ACRES) =     2.10   TOTAL RUNOFF(CFS) =      0.30

****************************************************************************
 FLOW PROCESS FROM NODE      8.00 TO NODE      7.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   896.00  DOWNSTREAM(FEET) =   882.00
 FLOW LENGTH(FEET) =   264.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   1.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.60
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.30
 PIPE TRAVEL TIME(MIN.) =   0.96    Tc(MIN.) =   92.53
 LONGEST FLOWPATH FROM NODE    260.00 TO NODE      7.00 =    1631.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

+--------------------------------------------------------------------------+
| BEGIN MODULAR WETLAND AND CULVERT NEXT TO BASIN 8                        |
| OFFSITE FLOW HYD                                                         |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```



```
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =  86
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   260.00
 UPSTREAM ELEVATION(FEET) =   1900.00
 DOWNSTREAM ELEVATION(FEET) =   1890.00
 ELEVATION DIFFERENCE(FEET) =     10.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    8.617
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.750
 SUBAREA RUNOFF(CFS) =      3.32
 TOTAL AREA(ACRES) =      1.65   TOTAL RUNOFF(CFS) =      3.32

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1890.00  DOWNSTREAM(FEET) =   1320.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  2803.00   CHANNEL SLOPE =  0.2034
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       3.32
 FLOW VELOCITY(FEET/SEC) =   6.07 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   7.69   Tc(MIN.) =   16.31
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =    3063.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.810
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =  86
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =   63.62   SUBAREA RUNOFF(CFS) =   84.84
 TOTAL AREA(ACRES) =       65.3   TOTAL RUNOFF(CFS) =      87.04
 TC(MIN.) =   16.31

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

```
 ELEVATION DATA: UPSTREAM(FEET) =   1320.00  DOWNSTREAM(FEET) =   1070.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  2053.00   CHANNEL SLOPE =  0.1218
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =      87.04
 FLOW VELOCITY(FEET/SEC) =  14.40 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.38   Tc(MIN.) =   18.69
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =    5116.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.490
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =  86
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =   81.12   SUBAREA RUNOFF(CFS) =   99.09
 TOTAL AREA(ACRES) =      146.4   TOTAL RUNOFF(CFS) =     178.81
 TC(MIN.) =   18.69

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   18.69
 RAINFALL INTENSITY(INCH/HR) =   3.49
 TOTAL STREAM AREA(ACRES) =   146.39
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    178.81

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =  86
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   171.00
 UPSTREAM ELEVATION(FEET) =   1200.00
 DOWNSTREAM ELEVATION(FEET) =   1180.00
 ELEVATION DIFFERENCE(FEET) =     20.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
```



```
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.061
 SUBAREA RUNOFF(CFS) =      2.22
 TOTAL AREA(ACRES) =      0.90   TOTAL RUNOFF(CFS) =      2.22

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     13.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1180.00  DOWNSTREAM(FEET) =   1070.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1511.00   CHANNEL SLOPE =  0.0728
 CHANNEL FLOW THRU SUBAREA(CFS) =       2.22
 FLOW VELOCITY(FEET/SEC) =   4.75 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   5.30   Tc(MIN.) =   11.57
 LONGEST FLOWPATH FROM NODE     14.00 TO NODE     13.00 =    1682.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     15.00 TO NODE     13.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.754
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =  86
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =   35.00   SUBAREA RUNOFF(CFS) =   58.24
 TOTAL AREA(ACRES) =       35.9   TOTAL RUNOFF(CFS) =      59.74
 TC(MIN.) =   11.57

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   11.57
 RAINFALL INTENSITY(INCH/HR) =   4.75
 TOTAL STREAM AREA(ACRES) =    35.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     59.74

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1      178.81    18.69        3.490        146.39
     2       59.74    11.57        4.754         35.90

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
```

```
 CONFLUENCE FORMULA USED FOR  2 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1      170.46    11.57       4.754
     2      222.66    18.69       3.490

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     222.66   Tc(MIN.) =   18.69
 TOTAL AREA(ACRES) =      182.3
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     13.00 =    5116.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE     16.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1070.00  DOWNSTREAM(FEET) =    960.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1882.00   CHANNEL SLOPE =  0.0584
 CHANNEL FLOW THRU SUBAREA(CFS) =     222.66
 FLOW VELOCITY(FEET/SEC) =  14.66 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.14   Tc(MIN.) =   20.82
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     16.00 =    6998.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     13.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.254
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =  86
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =   39.10   SUBAREA RUNOFF(CFS) =   44.53
 TOTAL AREA(ACRES) =      221.4   TOTAL RUNOFF(CFS) =     252.16
 TC(MIN.) =   20.82

****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   20.82
 RAINFALL INTENSITY(INCH/HR) =   3.25
 TOTAL STREAM AREA(ACRES) =   221.39
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    252.16
```



```
****************************************************************************
 FLOW PROCESS FROM NODE     17.00 TO NODE     18.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =  86
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   210.00
 UPSTREAM ELEVATION(FEET) =   1200.00
 DOWNSTREAM ELEVATION(FEET) =   1180.00
 ELEVATION DIFFERENCE(FEET) =     20.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.369
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.987
 SUBAREA RUNOFF(CFS) =      2.10
 TOTAL AREA(ACRES) =      0.86   TOTAL RUNOFF(CFS) =      2.10

****************************************************************************
 FLOW PROCESS FROM NODE     18.00 TO NODE     16.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1180.00  DOWNSTREAM(FEET) =    960.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1978.00   CHANNEL SLOPE =  0.1112
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       2.10
 FLOW VELOCITY(FEET/SEC) =   5.50 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   5.99   Tc(MIN.) =   12.36
 LONGEST FLOWPATH FROM NODE     17.00 TO NODE     16.00 =    2188.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.555
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =  86
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =   30.90   SUBAREA RUNOFF(CFS) =   49.26
 TOTAL AREA(ACRES) =       31.8   TOTAL RUNOFF(CFS) =      50.64
 TC(MIN.) =   12.36

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

```
 FLOW PROCESS FROM NODE     16.00 TO NODE     16.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   12.36
 RAINFALL INTENSITY(INCH/HR) =   4.56
 TOTAL STREAM AREA(ACRES) =    31.76
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     50.64

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1      252.16    20.82        3.254        221.39
     2       50.64    12.36        4.555         31.76

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1      230.78    12.36       4.555
     2      288.33    20.82       3.254

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     288.33   Tc(MIN.) =   20.82
 TOTAL AREA(ACRES) =      253.2
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     16.00 =    6998.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     19.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    960.00  DOWNSTREAM(FEET) =    905.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1320.00   CHANNEL SLOPE =  0.0417
 CHANNEL FLOW THRU SUBAREA(CFS) =     288.33
 FLOW VELOCITY(FEET/SEC) =  13.42 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.64   Tc(MIN.) =   22.46
 LONGEST FLOWPATH FROM NODE     10.00 TO NODE     19.00 =    8318.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     16.00 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.099
```



```
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =  86
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =   24.80   SUBAREA RUNOFF(CFS) =   26.90
 TOTAL AREA(ACRES) =      278.0   TOTAL RUNOFF(CFS) =     301.48
 TC(MIN.) =   22.46

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 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.) =   22.46
 RAINFALL INTENSITY(INCH/HR) =   3.10
 TOTAL STREAM AREA(ACRES) =   277.95
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    301.48

****************************************************************************
 FLOW PROCESS FROM NODE     19.10 TO NODE     19.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =  86
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   154.00
 UPSTREAM ELEVATION(FEET) =   1660.00
 DOWNSTREAM ELEVATION(FEET) =   1650.00
 ELEVATION DIFFERENCE(FEET) =     10.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.237
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.435
 SUBAREA RUNOFF(CFS) =      0.54
 TOTAL AREA(ACRES) =      0.24   TOTAL RUNOFF(CFS) =      0.54

****************************************************************************
 FLOW PROCESS FROM NODE     19.20 TO NODE     19.30 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1650.00  DOWNSTREAM(FEET) =   1050.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  3760.00   CHANNEL SLOPE =  0.1596
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
```

```
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.54
 FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =  13.21   Tc(MIN.) =   20.45
 LONGEST FLOWPATH FROM NODE     19.10 TO NODE     19.30 =    3914.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     19.20 TO NODE     19.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.293
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =  86
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =   80.94   SUBAREA RUNOFF(CFS) =   93.28
 TOTAL AREA(ACRES) =       81.2   TOTAL RUNOFF(CFS) =      93.56
 TC(MIN.) =   20.45

****************************************************************************
 FLOW PROCESS FROM NODE     19.30 TO NODE     19.40 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1050.00  DOWNSTREAM(FEET) =    998.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1953.00   CHANNEL SLOPE =  0.0266
 CHANNEL FLOW THRU SUBAREA(CFS) =      93.56
 FLOW VELOCITY(FEET/SEC) =   7.59 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   4.29   Tc(MIN.) =   24.74
 LONGEST FLOWPATH FROM NODE     19.10 TO NODE     19.40 =    5867.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     19.30 TO NODE     19.40 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.912
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =  86
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =  140.00   SUBAREA RUNOFF(CFS) =  142.71
 TOTAL AREA(ACRES) =      221.2   TOTAL RUNOFF(CFS) =     225.46
 TC(MIN.) =   24.74

****************************************************************************
 FLOW PROCESS FROM NODE     19.40 TO NODE     19.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
```



```
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    998.00  DOWNSTREAM(FEET) =    905.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  3826.00   CHANNEL SLOPE =  0.0243
 CHANNEL FLOW THRU SUBAREA(CFS) =     225.46
 FLOW VELOCITY(FEET/SEC) =   9.49 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   6.72   Tc(MIN.) =   31.45
 LONGEST FLOWPATH FROM NODE     19.10 TO NODE     19.00 =    9693.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     19.40 TO NODE     19.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.494
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =  86
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =  136.80   SUBAREA RUNOFF(CFS) =  119.42
 TOTAL AREA(ACRES) =      358.0   TOTAL RUNOFF(CFS) =     312.51
 TC(MIN.) =   31.45

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE     19.00 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.) =   31.45
 RAINFALL INTENSITY(INCH/HR) =   2.49
 TOTAL STREAM AREA(ACRES) =   357.98
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    312.51

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1      301.48    22.46        3.099        277.95
     2      312.51    31.45        2.494        357.98

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1      524.67    22.46       3.099
     2      555.15    31.45       2.494

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
```

```
 PEAK FLOW RATE(CFS) =     555.15   Tc(MIN.) =   31.45
 TOTAL AREA(ACRES) =      635.9
 LONGEST FLOWPATH FROM NODE     19.10 TO NODE     19.00 =    9693.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE      7.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    905.00  DOWNSTREAM(FEET) =    882.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   991.00   CHANNEL SLOPE =  0.0232
 CHANNEL FLOW THRU SUBAREA(CFS) =     555.15
 FLOW VELOCITY(FEET/SEC) =  12.34 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.34   Tc(MIN.) =   32.79
 LONGEST FLOWPATH FROM NODE     19.10 TO NODE      7.00 =   10684.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     19.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.428
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =  86
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =    4.17   SUBAREA RUNOFF(CFS) =    3.54
 TOTAL AREA(ACRES) =      640.1   TOTAL RUNOFF(CFS) =     555.15
 TC(MIN.) =   32.79
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  4
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   32.79
 RAINFALL INTENSITY(INCH/HR) =   2.43
 TOTAL STREAM AREA(ACRES) =   640.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    555.15

****************************************************************************
 FLOW PROCESS FROM NODE    220.00 TO NODE    221.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
```



```
 S.C.S. CURVE NUMBER (AMC II) =  86
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   180.00
 UPSTREAM ELEVATION(FEET) =   1022.00
 DOWNSTREAM ELEVATION(FEET) =   1000.00
 ELEVATION DIFFERENCE(FEET) =     22.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.061
 SUBAREA RUNOFF(CFS) =      1.88
 TOTAL AREA(ACRES) =      0.76   TOTAL RUNOFF(CFS) =      1.88

****************************************************************************
 FLOW PROCESS FROM NODE    221.00 TO NODE      7.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1000.00  DOWNSTREAM(FEET) =    882.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  2240.00   CHANNEL SLOPE =  0.0527
 CHANNEL FLOW THRU SUBAREA(CFS) =       1.88
 FLOW VELOCITY(FEET/SEC) =   3.90 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   9.58   Tc(MIN.) =   15.84
 LONGEST FLOWPATH FROM NODE    220.00 TO NODE      7.00 =    2420.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    221.00 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.882
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =  86
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =   39.39   SUBAREA RUNOFF(CFS) =   53.52
 TOTAL AREA(ACRES) =       40.1   TOTAL RUNOFF(CFS) =      54.55
 TC(MIN.) =   15.84

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  4
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   15.84
 RAINFALL INTENSITY(INCH/HR) =   3.88
 TOTAL STREAM AREA(ACRES) =    40.15
```

```
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     54.55

****************************************************************************
 FLOW PROCESS FROM NODE     20.10 TO NODE     20.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =  86
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =   1455.00
 DOWNSTREAM ELEVATION(FEET) =   1440.00
 ELEVATION DIFFERENCE(FEET) =     15.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
 WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.061
 SUBAREA RUNOFF(CFS) =      0.67
 TOTAL AREA(ACRES) =      0.27   TOTAL RUNOFF(CFS) =      0.67

****************************************************************************
 FLOW PROCESS FROM NODE     20.20 TO NODE     20.30 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1440.00  DOWNSTREAM(FEET) =    975.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  2700.00   CHANNEL SLOPE =  0.1722
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.67
 FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   9.49   Tc(MIN.) =   15.75
 LONGEST FLOWPATH FROM NODE     20.10 TO NODE     20.30 =    2800.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     20.20 TO NODE     20.30 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.896
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =  86
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =   58.35   SUBAREA RUNOFF(CFS) =   79.57
 TOTAL AREA(ACRES) =       58.6   TOTAL RUNOFF(CFS) =      79.94
 TC(MIN.) =   15.75

****************************************************************************
 FLOW PROCESS FROM NODE     20.30 TO NODE      7.00 IS CODE =  52
```



```
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    975.00  DOWNSTREAM(FEET) =    882.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1855.00   CHANNEL SLOPE =  0.0501
 CHANNEL FLOW THRU SUBAREA(CFS) =      79.94
 FLOW VELOCITY(FEET/SEC) =   9.94 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   3.11   Tc(MIN.) =   18.86
 LONGEST FLOWPATH FROM NODE     20.10 TO NODE      7.00 =    4655.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     20.30 TO NODE      7.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.469
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =  86
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =   51.56   SUBAREA RUNOFF(CFS) =   62.60
 TOTAL AREA(ACRES) =      110.2   TOTAL RUNOFF(CFS) =     133.76
 TC(MIN.) =   18.86

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  4
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION(MIN.) =   18.86
 RAINFALL INTENSITY(INCH/HR) =   3.47
 TOTAL STREAM AREA(ACRES) =   110.18
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    133.76

****************************************************************************
 FLOW PROCESS FROM NODE    230.00 TO NODE    231.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .5200
 S.C.S. CURVE NUMBER (AMC II) =  86
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   150.00
 UPSTREAM ELEVATION(FEET) =    940.00
 DOWNSTREAM ELEVATION(FEET) =    911.00
 ELEVATION DIFFERENCE(FEET) =     29.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.846
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
```

```
         THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
         (Reference: Table 3-1B of Hydrology Manual)
         THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.168
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      1.23
  TOTAL AREA(ACRES) =      0.29   TOTAL RUNOFF(CFS) =      1.23

****************************************************************************
  FLOW PROCESS FROM NODE    231.00 TO NODE      7.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION # 10 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  911.00  DOWNSTREAM ELEVATION(FEET) =  896.60
  STREET LENGTH(FEET) =   762.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 17.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.56
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =    9.77
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.06
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.98
  STREET FLOW TRAVEL TIME(MIN.) =   4.16   Tc(MIN.) =    9.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.589
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =  86
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.812
  SUBAREA AREA(ACRES) =    2.26      SUBAREA RUNOFF(CFS) =   10.74
  TOTAL AREA(ACRES) =        2.5        PEAK FLOW RATE(CFS) =      11.58

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  12.43
  FLOW VELOCITY(FEET/SEC.) =  3.48   DEPTH*VELOCITY(FT*FT/SEC.) =   1.30
  LONGEST FLOWPATH FROM NODE    230.00 TO NODE      7.00 =     912.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```



```
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  4
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  4 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.00
  RAINFALL INTENSITY(INCH/HR) =   5.59
  TOTAL STREAM AREA(ACRES) =     2.55
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.58

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      555.15    32.79        2.428        640.10
      2       54.55    15.84        3.882         40.15
      3      133.76    18.86        3.469        110.18
      4       11.58     9.00        5.589          2.55

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  4 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      347.59     9.00       5.589
      2      522.16    15.84       3.882
      3      578.29    18.86       3.469
      4      687.93    32.79       2.428

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     687.93   Tc(MIN.) =   32.79
  TOTAL AREA(ACRES) =      793.0
  LONGEST FLOWPATH FROM NODE     19.10 TO NODE      7.00 =   10684.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1      687.93    32.79       2.428      792.98
  LONGEST FLOWPATH FROM NODE     19.10 TO NODE      7.00 =   10684.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        0.30    92.53       1.244        2.10
  LONGEST FLOWPATH FROM NODE    260.00 TO NODE      7.00 =    1631.00 FEET.
```

```
  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1     688.04      32.79        2.428
      2     352.66      92.53        1.244

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     688.04   Tc(MIN.) =   32.79
  TOTAL AREA(ACRES) =      795.1

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

+--------------------------------------------------------------------------+
| END MODULAR WETLAND AND CULVERT NEXT TO BASIN 8 HYD                      |
| END ZONE 1 HYD                                                           |
|                                                                          |
+--------------------------------------------------------------------------+
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      795.1  TC(MIN.) =     32.79
  PEAK FLOW RATE(CFS)   =     688.04
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

CHAPTER 5

5.1.2 – Rational Method Hydrologic Analysis (AES 2015)

AES Zone 2

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

          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                       2003,1985,1981 HYDROLOGY MANUAL
       (c) Copyright 1982-2015 Advanced Engineering Software (aes)
           Ver. 22.0 Release Date: 07/01/2015  License ID 1239

                        Analysis prepared by:




----------------------------------------------------------------------------
  FILE NAME: R:\1235\HYD\CALCS\AES\SRP\ATT\ZONE2.DAT
  TIME/DATE OF STUDY: 10:14 09/10/2019
----------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
----------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.100
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *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   20.0     10.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  2   20.0     10.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  3   20.0     10.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  4   20.0     10.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  5   20.0     10.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  6   20.0     10.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  7   16.0      8.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  8   20.0     10.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  9   18.0      9.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
 10   17.0     10.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
 11   14.0      7.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
```



```
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

+---------------------------------------------------------------------------+
| BEGIN ZONE 2 HYD                                                          |
|                                                                           |
| BASIN 6 UPSTREAM BYPASS                                                   |
+---------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE     21.10 TO NODE     21.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   220.00
  UPSTREAM ELEVATION(FEET) =   1016.00
  DOWNSTREAM ELEVATION(FEET) =    990.00
  ELEVATION DIFFERENCE(FEET) =     26.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.061
  SUBAREA RUNOFF(CFS) =      1.01
  TOTAL AREA(ACRES) =      0.41   TOTAL RUNOFF(CFS) =      1.01

****************************************************************************
  FLOW PROCESS FROM NODE     21.20 TO NODE     21.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    990.00  DOWNSTREAM(FEET) =    860.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   683.00   CHANNEL SLOPE =  0.1903
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.01
  FLOW VELOCITY(FEET/SEC) =   4.76 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.39   Tc(MIN.) =    8.66
  LONGEST FLOWPATH FROM NODE     21.10 TO NODE     21.00 =     903.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     21.20 TO NODE     21.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.731
  *USER SPECIFIED(SUBAREA):
```

```
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =    4.91   SUBAREA RUNOFF(CFS) =    9.85
 TOTAL AREA(ACRES) =        5.3   TOTAL RUNOFF(CFS) =      10.67
 TC(MIN.) =    8.66

****************************************************************************
 FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   860.00  DOWNSTREAM(FEET) =   855.00
 FLOW LENGTH(FEET) =   324.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.06
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      10.67
 PIPE TRAVEL TIME(MIN.) =   0.67    Tc(MIN.) =    9.33
 LONGEST FLOWPATH FROM NODE     21.10 TO NODE     22.00 =    1227.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 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.) =    9.33
 RAINFALL INTENSITY(INCH/HR) =   5.46
 TOTAL STREAM AREA(ACRES) =     5.32
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.67

****************************************************************************
 FLOW PROCESS FROM NODE    867.00 TO NODE    868.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    80.00
 UPSTREAM ELEVATION(FEET) =    910.00
 DOWNSTREAM ELEVATION(FEET) =    900.00
 ELEVATION DIFFERENCE(FEET) =     10.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.605
 WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.588
 SUBAREA RUNOFF(CFS) =      0.72
 TOTAL AREA(ACRES) =      0.27   TOTAL RUNOFF(CFS) =      0.72
```



```
****************************************************************************
 FLOW PROCESS FROM NODE    868.00 TO NODE    869.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    900.00  DOWNSTREAM(FEET) =    860.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   243.00   CHANNEL SLOPE =  0.1646
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .1423 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.72
 FLOW VELOCITY(FEET/SEC) =   2.11 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.92   Tc(MIN.) =    7.52
 LONGEST FLOWPATH FROM NODE    867.00 TO NODE    869.00 =     323.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    868.00 TO NODE    869.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.276
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =    6.64   SUBAREA RUNOFF(CFS) =   14.59
 TOTAL AREA(ACRES) =        6.9   TOTAL RUNOFF(CFS) =      15.18
 TC(MIN.) =    7.52

****************************************************************************
 FLOW PROCESS FROM NODE    869.00 TO NODE     22.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   860.00  DOWNSTREAM(FEET) =   855.00
 FLOW LENGTH(FEET) =   122.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.81
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      15.18
 PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =    7.68
 LONGEST FLOWPATH FROM NODE    867.00 TO NODE     22.00 =     445.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     22.00 TO NODE     22.00 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.) =    7.68
  RAINFALL INTENSITY(INCH/HR) =   6.19
  TOTAL STREAM AREA(ACRES) =     6.91
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     15.18

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       10.67     9.33        5.462          5.32
      2       15.18     7.68        6.192          6.91

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       23.96     7.68       6.192
      2       24.06     9.33       5.462

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      24.06   Tc(MIN.) =    9.33
  TOTAL AREA(ACRES) =       12.2
  LONGEST FLOWPATH FROM NODE     21.10 TO NODE     22.00 =    1227.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   855.00  DOWNSTREAM(FEET) =   850.00
  FLOW LENGTH(FEET) =   821.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  19.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.01
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      24.06
  PIPE TRAVEL TIME(MIN.) =   1.95    Tc(MIN.) =   11.28
  LONGEST FLOWPATH FROM NODE     21.10 TO NODE     23.00 =    2048.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 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.) =   11.28
```



```
  RAINFALL INTENSITY(INCH/HR) =   4.83
  TOTAL STREAM AREA(ACRES) =    12.23
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     24.06

****************************************************************************
  FLOW PROCESS FROM NODE     23.10 TO NODE     23.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    88.00
  UPSTREAM ELEVATION(FEET) =    905.00
  DOWNSTREAM ELEVATION(FEET) =    900.00
  ELEVATION DIFFERENCE(FEET) =      5.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.097
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.516
  SUBAREA RUNOFF(CFS) =      0.25
  TOTAL AREA(ACRES) =      0.11   TOTAL RUNOFF(CFS) =      0.25

****************************************************************************
  FLOW PROCESS FROM NODE     23.20 TO NODE     23.30 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    900.00  DOWNSTREAM(FEET) =    860.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   350.00   CHANNEL SLOPE =  0.1143
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.25
  FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.23   Tc(MIN.) =    8.33
  LONGEST FLOWPATH FROM NODE     23.10 TO NODE     23.30 =     438.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     23.20 TO NODE     23.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.878
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    1.33   SUBAREA RUNOFF(CFS) =    2.74
  TOTAL AREA(ACRES) =       1.4   TOTAL RUNOFF(CFS) =       2.96
  TC(MIN.) =    8.33

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

```
 FLOW PROCESS FROM NODE     23.30 TO NODE     23.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   860.00  DOWNSTREAM(FEET) =   850.00
 FLOW LENGTH(FEET) =   136.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.25
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       2.96
 PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =    8.55
 LONGEST FLOWPATH FROM NODE     23.10 TO NODE     23.00 =     574.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     23.00 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.) =    8.55
 RAINFALL INTENSITY(INCH/HR) =   5.78
 TOTAL STREAM AREA(ACRES) =     1.44
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.96

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       24.06    11.28        4.832        12.23
     2        2.96     8.55        5.779         1.44

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       23.08     8.55       5.779
     2       26.54    11.28       4.832

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      26.54   Tc(MIN.) =   11.28
 TOTAL AREA(ACRES) =       13.7
 LONGEST FLOWPATH FROM NODE     21.10 TO NODE     23.00 =    2048.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     23.00 TO NODE     24.00 IS CODE =  31
----------------------------------------------------------------------------
```



```
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   850.00  DOWNSTREAM(FEET) =   800.00
 FLOW LENGTH(FEET) =   906.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.47
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      26.54
 PIPE TRAVEL TIME(MIN.) =   0.92    Tc(MIN.) =   12.20
 LONGEST FLOWPATH FROM NODE     21.10 TO NODE     24.00 =    2954.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 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.) =   12.20
 RAINFALL INTENSITY(INCH/HR) =   4.59
 TOTAL STREAM AREA(ACRES) =    13.67
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     26.54

****************************************************************************
 FLOW PROCESS FROM NODE    877.00 TO NODE    878.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   200.00
 UPSTREAM ELEVATION(FEET) =    950.00
 DOWNSTREAM ELEVATION(FEET) =    910.00
 ELEVATION DIFFERENCE(FEET) =     40.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.061
 SUBAREA RUNOFF(CFS) =      0.86
 TOTAL AREA(ACRES) =      0.35   TOTAL RUNOFF(CFS) =      0.86

****************************************************************************
 FLOW PROCESS FROM NODE    878.00 TO NODE     24.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
```

```
 ELEVATION DATA: UPSTREAM(FEET) =    910.00  DOWNSTREAM(FEET) =    800.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1080.00   CHANNEL SLOPE =  0.1019
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.86
 FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   3.79   Tc(MIN.) =   10.06
 LONGEST FLOWPATH FROM NODE    877.00 TO NODE     24.00 =    1280.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    878.00 TO NODE     24.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.203
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =    9.98   SUBAREA RUNOFF(CFS) =   18.17
 TOTAL AREA(ACRES) =       10.3   TOTAL RUNOFF(CFS) =      18.81
 TC(MIN.) =   10.06

****************************************************************************
 FLOW PROCESS FROM NODE     24.00 TO NODE     24.00 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.) =   10.06
 RAINFALL INTENSITY(INCH/HR) =   5.20
 TOTAL STREAM AREA(ACRES) =    10.33
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     18.81

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       26.54    12.20        4.595         13.67
     2       18.81    10.06        5.203         10.33

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       42.25    10.06       5.203
     2       43.15    12.20       4.595
```



```
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      43.15   Tc(MIN.) =   12.20
 TOTAL AREA(ACRES) =       24.0
 LONGEST FLOWPATH FROM NODE     21.10 TO NODE     24.00 =    2954.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     24.00 TO NODE     25.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   800.00  DOWNSTREAM(FEET) =   750.00
 FLOW LENGTH(FEET) =   785.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  19.56
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      43.15
 PIPE TRAVEL TIME(MIN.) =   0.67    Tc(MIN.) =   12.87
 LONGEST FLOWPATH FROM NODE     21.10 TO NODE     25.00 =    3739.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    860.00 TO NODE    861.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =   1310.00
 DOWNSTREAM ELEVATION(FEET) =   1300.00
 ELEVATION DIFFERENCE(FEET) =     10.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
 WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.061
 SUBAREA RUNOFF(CFS) =      1.26
 TOTAL AREA(ACRES) =      0.51   TOTAL RUNOFF(CFS) =      1.26

****************************************************************************
 FLOW PROCESS FROM NODE    861.00 TO NODE    862.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1300.00  DOWNSTREAM(FEET) =    945.00
```

```
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1851.00   CHANNEL SLOPE =  0.1918
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1559 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.26
  FLOW VELOCITY(FEET/SEC) =   2.39 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =  12.92   Tc(MIN.) =   19.18
  LONGEST FLOWPATH FROM NODE    860.00 TO NODE    862.00 =    1951.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    861.00 TO NODE    862.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.431
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   20.10   SUBAREA RUNOFF(CFS) =   24.14
  TOTAL AREA(ACRES) =       20.6   TOTAL RUNOFF(CFS) =      24.75
  TC(MIN.) =   19.18

****************************************************************************
  FLOW PROCESS FROM NODE    862.00 TO NODE    862.10 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   945.00  DOWNSTREAM(FEET) =   890.00
  FLOW LENGTH(FEET) =   611.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.34
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      24.75
  PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =   19.71
  LONGEST FLOWPATH FROM NODE    860.00 TO NODE    862.10 =    2562.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    862.10 TO NODE    863.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    890.00  DOWNSTREAM(FEET) =    867.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   310.00   CHANNEL SLOPE =  0.0742
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0742 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      24.75
  FLOW VELOCITY(FEET/SEC) =   4.44 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.16   Tc(MIN.) =   20.87
  LONGEST FLOWPATH FROM NODE    860.00 TO NODE    863.00 =    2872.00 FEET.
```



```
****************************************************************************
  FLOW PROCESS FROM NODE    862.10 TO NODE    863.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.249
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   10.20   SUBAREA RUNOFF(CFS) =   11.60
  TOTAL AREA(ACRES) =       30.8   TOTAL RUNOFF(CFS) =      35.04
  TC(MIN.) =   20.87

****************************************************************************
  FLOW PROCESS FROM NODE    863.00 TO NODE    857.00 IS CODE =  53
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    867.00  DOWNSTREAM(FEET) =    780.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1025.00   CHANNEL SLOPE =  0.0849
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0849 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      35.04
  FLOW VELOCITY(FEET/SEC) =   5.33 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.20   Tc(MIN.) =   24.08
  LONGEST FLOWPATH FROM NODE    860.00 TO NODE    857.00 =    3897.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    863.00 TO NODE    857.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.963
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   15.20   SUBAREA RUNOFF(CFS) =   15.77
  TOTAL AREA(ACRES) =       46.0   TOTAL RUNOFF(CFS) =      47.72
  TC(MIN.) =   24.08

****************************************************************************
  FLOW PROCESS FROM NODE    857.00 TO NODE    857.00 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.) =   24.08
 RAINFALL INTENSITY(INCH/HR) =   2.96
 TOTAL STREAM AREA(ACRES) =    46.01
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     47.72

****************************************************************************
 FLOW PROCESS FROM NODE    850.00 TO NODE    851.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =   1880.00
 DOWNSTREAM ELEVATION(FEET) =   1870.00
 ELEVATION DIFFERENCE(FEET) =     10.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
 WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.061
 SUBAREA RUNOFF(CFS) =      1.61
 TOTAL AREA(ACRES) =      0.65   TOTAL RUNOFF(CFS) =      1.61

****************************************************************************
 FLOW PROCESS FROM NODE    851.00 TO NODE    852.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1870.00  DOWNSTREAM(FEET) =   1430.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1062.00   CHANNEL SLOPE =  0.4143
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       1.61
 FLOW VELOCITY(FEET/SEC) =   5.20 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   3.40   Tc(MIN.) =    9.67
 LONGEST FLOWPATH FROM NODE    850.00 TO NODE    852.00 =    1162.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    851.00 TO NODE    852.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.338
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =   18.66   SUBAREA RUNOFF(CFS) =   34.86
 TOTAL AREA(ACRES) =       19.3   TOTAL RUNOFF(CFS) =      36.08
 TC(MIN.) =    9.67
```



```
****************************************************************************
 FLOW PROCESS FROM NODE    852.00 TO NODE    853.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1430.00  DOWNSTREAM(FEET) =   1260.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1033.00   CHANNEL SLOPE =  0.1646
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =      36.08
 FLOW VELOCITY(FEET/SEC) =  11.15 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.54   Tc(MIN.) =   11.21
 LONGEST FLOWPATH FROM NODE    850.00 TO NODE    853.00 =    2195.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    852.00 TO NODE    853.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.851
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =   36.90   SUBAREA RUNOFF(CFS) =   62.66
 TOTAL AREA(ACRES) =       56.2   TOTAL RUNOFF(CFS) =      95.45
 TC(MIN.) =   11.21

****************************************************************************
 FLOW PROCESS FROM NODE    853.00 TO NODE    854.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1260.00  DOWNSTREAM(FEET) =   1150.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1030.00   CHANNEL SLOPE =  0.1068
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .1051 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =      95.45
 FLOW VELOCITY(FEET/SEC) =   8.28 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.07   Tc(MIN.) =   13.28
 LONGEST FLOWPATH FROM NODE    850.00 TO NODE    854.00 =    3225.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    853.00 TO NODE    854.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.349
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
```

```
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =   31.63   SUBAREA RUNOFF(CFS) =   48.14
 TOTAL AREA(ACRES) =       87.8   TOTAL RUNOFF(CFS) =     133.70
 TC(MIN.) =   13.28

****************************************************************************
 FLOW PROCESS FROM NODE    854.00 TO NODE    855.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1150.00  DOWNSTREAM(FEET) =   1040.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   987.00   CHANNEL SLOPE =  0.1114
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =     133.70
 FLOW VELOCITY(FEET/SEC) =  16.39 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.00   Tc(MIN.) =   14.29
 LONGEST FLOWPATH FROM NODE    850.00 TO NODE    855.00 =    4212.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    854.00 TO NODE    855.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.149
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =   32.36   SUBAREA RUNOFF(CFS) =   46.99
 TOTAL AREA(ACRES) =      120.2   TOTAL RUNOFF(CFS) =     174.56
 TC(MIN.) =   14.29

****************************************************************************
 FLOW PROCESS FROM NODE    855.00 TO NODE    856.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1040.00  DOWNSTREAM(FEET) =    890.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1055.00   CHANNEL SLOPE =  0.1422
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =     174.56
 FLOW VELOCITY(FEET/SEC) =  17.78 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.99   Tc(MIN.) =   15.28
 LONGEST FLOWPATH FROM NODE    850.00 TO NODE    856.00 =    5267.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    855.00 TO NODE    856.00 IS CODE =  81
----------------------------------------------------------------------------
```



```
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.974
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =   39.53   SUBAREA RUNOFF(CFS) =   54.98
 TOTAL AREA(ACRES) =      159.7   TOTAL RUNOFF(CFS) =     222.16
 TC(MIN.) =   15.28

****************************************************************************
 FLOW PROCESS FROM NODE    856.00 TO NODE    857.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    890.00  DOWNSTREAM(FEET) =    780.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   858.00   CHANNEL SLOPE =  0.1282
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =     222.16
 FLOW VELOCITY(FEET/SEC) =  19.16 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.75   Tc(MIN.) =   16.02
 LONGEST FLOWPATH FROM NODE    850.00 TO NODE    857.00 =    6125.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    856.00 TO NODE    857.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.854
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =   10.49   SUBAREA RUNOFF(CFS) =   14.15
 TOTAL AREA(ACRES) =      170.2   TOTAL RUNOFF(CFS) =     229.58
 TC(MIN.) =   16.02

****************************************************************************
 FLOW PROCESS FROM NODE    857.00 TO NODE    857.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   16.02
 RAINFALL INTENSITY(INCH/HR) =   3.85
 TOTAL STREAM AREA(ACRES) =   170.22
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    229.58
```

```
 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       47.72    24.08        2.963         46.01
     2      229.58    16.02        3.854        170.22

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1      261.34    16.02       3.854
     2      224.27    24.08       2.963

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     261.34   Tc(MIN.) =   16.02
 TOTAL AREA(ACRES) =      216.2
 LONGEST FLOWPATH FROM NODE    850.00 TO NODE    857.00 =    6125.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    857.00 TO NODE     25.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   780.00  DOWNSTREAM(FEET) =   755.00
 FLOW LENGTH(FEET) =   333.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  42.0 INCH PIPE IS  33.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  31.82
 ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     261.34
 PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   16.20
 LONGEST FLOWPATH FROM NODE    850.00 TO NODE     25.10 =    6458.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     25.10 TO NODE     25.10 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   16.20
 RAINFALL INTENSITY(INCH/HR) =   3.83
 TOTAL STREAM AREA(ACRES) =   216.23
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    261.34

****************************************************************************
 FLOW PROCESS FROM NODE    864.10 TO NODE    864.20 IS CODE =  21
----------------------------------------------------------------------------
```



```
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   143.00
 UPSTREAM ELEVATION(FEET) =    862.00
 DOWNSTREAM ELEVATION(FEET) =    855.00
 ELEVATION DIFFERENCE(FEET) =      7.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.951
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.056
 SUBAREA RUNOFF(CFS) =      0.45
 TOTAL AREA(ACRES) =      0.21   TOTAL RUNOFF(CFS) =      0.45

****************************************************************************
 FLOW PROCESS FROM NODE    864.20 TO NODE    864.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    855.00  DOWNSTREAM(FEET) =    760.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   730.00   CHANNEL SLOPE =  0.1301
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.45
 FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.56   Tc(MIN.) =   10.52
 LONGEST FLOWPATH FROM NODE    864.10 TO NODE    864.00 =     873.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    864.20 TO NODE    864.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.056
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =    5.55   SUBAREA RUNOFF(CFS) =    9.82
 TOTAL AREA(ACRES) =       5.8   TOTAL RUNOFF(CFS) =     10.19
 TC(MIN.) =   10.52

****************************************************************************
 FLOW PROCESS FROM NODE    864.00 TO NODE     25.10 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   760.00  DOWNSTREAM(FEET) =   755.00
  FLOW LENGTH(FEET) =    77.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.86
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.19
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   10.61
  LONGEST FLOWPATH FROM NODE    864.10 TO NODE     25.10 =     950.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     25.10 TO NODE     25.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.61
  RAINFALL INTENSITY(INCH/HR) =   5.03
  TOTAL STREAM AREA(ACRES) =     5.76
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.19

****************************************************************************
  FLOW PROCESS FROM NODE     25.60 TO NODE     25.70 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   135.00
  UPSTREAM ELEVATION(FEET) =    804.00
  DOWNSTREAM ELEVATION(FEET) =    802.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =   10.407
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    77.22
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.091
  SUBAREA RUNOFF(CFS) =      0.39
  TOTAL AREA(ACRES) =      0.22   TOTAL RUNOFF(CFS) =      0.39

****************************************************************************
  FLOW PROCESS FROM NODE     25.70 TO NODE     25.10 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
```



```
  ELEVATION DATA: UPSTREAM(FEET) =    802.00  DOWNSTREAM(FEET) =    755.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   806.00   CHANNEL SLOPE =  0.0583
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.39
  FLOW VELOCITY(FEET/SEC) =   3.62 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.71   Tc(MIN.) =   14.12
  LONGEST FLOWPATH FROM NODE     25.60 TO NODE     25.10 =     941.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     25.70 TO NODE     25.10 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.182
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    7.12   SUBAREA RUNOFF(CFS) =   10.42
  TOTAL AREA(ACRES) =       7.3   TOTAL RUNOFF(CFS) =      10.74
  TC(MIN.) =   14.12

****************************************************************************
  FLOW PROCESS FROM NODE     25.10 TO NODE     25.10 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =   14.12
  RAINFALL INTENSITY(INCH/HR) =   4.18
  TOTAL STREAM AREA(ACRES) =     7.34
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.74

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      261.34    16.20        3.827        216.23
      2       10.19    10.61        5.028          5.76
      3       10.74    14.12        4.182          7.34

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      217.18    10.61       5.028
      2      258.36    14.12       4.182
      3      278.93    16.20       3.827
```

```
 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     278.93   Tc(MIN.) =   16.20
 TOTAL AREA(ACRES) =      229.3
 LONGEST FLOWPATH FROM NODE    850.00 TO NODE     25.10 =    6458.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     25.10 TO NODE     25.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   755.00  DOWNSTREAM(FEET) =   750.00
 FLOW LENGTH(FEET) =   400.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  48.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.48
 ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     278.93
 PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =   16.60
 LONGEST FLOWPATH FROM NODE    850.00 TO NODE     25.00 =    6858.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1      278.93    16.60       3.766      229.33
 LONGEST FLOWPATH FROM NODE    850.00 TO NODE     25.00 =    6858.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1       43.15    12.87       4.439       24.00
 LONGEST FLOWPATH FROM NODE     21.10 TO NODE     25.00 =    3739.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc      INTENSITY
 NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1     259.31      12.87        4.439
     2     315.54      16.60        3.766

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     315.54   Tc(MIN.) =   16.60
 TOTAL AREA(ACRES) =      253.3

****************************************************************************
 FLOW PROCESS FROM NODE     25.00 TO NODE     25.00 IS CODE =  12
```



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

****************************************************************************
 FLOW PROCESS FROM NODE     25.00 TO NODE     26.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   750.00  DOWNSTREAM(FEET) =   734.00
 FLOW LENGTH(FEET) =   313.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  39.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  28.72
 ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     315.54
 PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   16.78
 LONGEST FLOWPATH FROM NODE    850.00 TO NODE     26.00 =    7171.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     26.00 TO NODE     26.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

+----------------------------------------------------------------------------+
| END BASIN 6 UPSTREAM BYPASS                                                |
| BEGIN BASIN 6 UPSTREAM HYD                                                 |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    600.00 TO NODE    601.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
 UPSTREAM ELEVATION(FEET) =    888.85
 DOWNSTREAM ELEVATION(FEET) =    888.15
 ELEVATION DIFFERENCE(FEET) =      0.70
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.777
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    70.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.713
 SUBAREA RUNOFF(CFS) =      1.13
 TOTAL AREA(ACRES) =      0.26   TOTAL RUNOFF(CFS) =      1.13
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    601.00 TO NODE    602.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  9 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  887.00  DOWNSTREAM ELEVATION(FEET) =  869.00
  STREET LENGTH(FEET) =   565.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.95
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.34
    HALFSTREET FLOOD WIDTH(FEET) =   10.44
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.10
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.37
  STREET FLOW TRAVEL TIME(MIN.) =   2.30   Tc(MIN.) =    9.07
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.561
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.650
  SUBAREA AREA(ACRES) =    2.10      SUBAREA RUNOFF(CFS) =    7.59
  TOTAL AREA(ACRES) =        2.4        PEAK FLOW RATE(CFS) =       8.53

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  13.11
  FLOW VELOCITY(FEET/SEC.) =  4.64   DEPTH*VELOCITY(FT*FT/SEC.) =   1.80
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    602.00 =     635.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    602.00 TO NODE    604.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   859.00  DOWNSTREAM(FEET) =   858.00
  FLOW LENGTH(FEET) =    26.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.90
```



```
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.53
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    9.11
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    604.00 =     661.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    604.00 TO NODE    604.00 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.) =    9.11
  RAINFALL INTENSITY(INCH/HR) =   5.55
  TOTAL STREAM AREA(ACRES) =     2.36
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.53

****************************************************************************
  FLOW PROCESS FROM NODE    608.00 TO NODE    609.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
  UPSTREAM ELEVATION(FEET) =    877.00
  DOWNSTREAM ELEVATION(FEET) =    876.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.017
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.248
  SUBAREA RUNOFF(CFS) =      1.18
  TOTAL AREA(ACRES) =      0.25   TOTAL RUNOFF(CFS) =      1.18

****************************************************************************
  FLOW PROCESS FROM NODE    609.00 TO NODE    603.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  9 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  876.00  DOWNSTREAM ELEVATION(FEET) =  859.00
  STREET LENGTH(FEET) =   502.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

```
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.62
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.33
   HALFSTREET FLOOD WIDTH(FEET) =   10.02
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.11
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.34
 STREET FLOW TRAVEL TIME(MIN.) =   2.03   Tc(MIN.) =    8.05
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.007
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.650
 SUBAREA AREA(ACRES) =    1.75      SUBAREA RUNOFF(CFS) =    6.83
 TOTAL AREA(ACRES) =        2.0        PEAK FLOW RATE(CFS) =       7.81

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  12.48
 FLOW VELOCITY(FEET/SEC.) =  4.66   DEPTH*VELOCITY(FT*FT/SEC.) =   1.75
 LONGEST FLOWPATH FROM NODE    608.00 TO NODE    603.00 =     572.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    603.00 TO NODE    604.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   859.00  DOWNSTREAM(FEET) =   858.00
 FLOW LENGTH(FEET) =    26.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.65
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       7.81
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    8.09
 LONGEST FLOWPATH FROM NODE    608.00 TO NODE    604.00 =     598.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    604.00 TO NODE    604.00 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.) =    8.09
 RAINFALL INTENSITY(INCH/HR) =   5.99
 TOTAL STREAM AREA(ACRES) =     2.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.81
```



```
 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        8.53     9.11        5.545          2.36
     2        7.81     8.09        5.988          2.00

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       15.38     8.09       5.988
     2       15.76     9.11       5.545

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      15.76   Tc(MIN.) =    9.11
 TOTAL AREA(ACRES) =        4.4
 LONGEST FLOWPATH FROM NODE    600.00 TO NODE    604.00 =     661.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    604.00 TO NODE    610.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   858.00  DOWNSTREAM(FEET) =   854.00
 FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.86
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      15.76
 PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =    9.28
 LONGEST FLOWPATH FROM NODE    600.00 TO NODE    610.00 =     781.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    610.00 TO NODE    610.00 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) =   5.48
 TOTAL STREAM AREA(ACRES) =     4.36
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     15.76

****************************************************************************
 FLOW PROCESS FROM NODE    605.00 TO NODE    606.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
==========================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .5200
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
  UPSTREAM ELEVATION(FEET) =    886.00
  DOWNSTREAM ELEVATION(FEET) =    882.00
  ELEVATION DIFFERENCE(FEET) =      4.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.886
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.168
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.68
  TOTAL AREA(ACRES) =      0.16   TOTAL RUNOFF(CFS) =      0.68

**************************************************************************
  FLOW PROCESS FROM NODE    606.00 TO NODE    607.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   882.00  DOWNSTREAM(FEET) =   869.00
  FLOW LENGTH(FEET) =   430.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.85
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.68
  PIPE TRAVEL TIME(MIN.) =   1.48    Tc(MIN.) =    6.36
  LONGEST FLOWPATH FROM NODE    605.00 TO NODE    607.00 =     500.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    606.00 TO NODE    607.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.992
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .5200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5200
  SUBAREA AREA(ACRES) =    0.66   SUBAREA RUNOFF(CFS) =    2.40
  TOTAL AREA(ACRES) =        0.8   TOTAL RUNOFF(CFS) =       2.98
  TC(MIN.) =    6.36

**************************************************************************
  FLOW PROCESS FROM NODE    607.00 TO NODE    610.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   865.00  DOWNSTREAM(FEET) =   864.00
```



```
  FLOW LENGTH(FEET) =    63.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.94
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.98
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =    6.54
  LONGEST FLOWPATH FROM NODE    605.00 TO NODE    610.00 =     563.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    610.00 TO NODE    610.00 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.) =    6.54
  RAINFALL INTENSITY(INCH/HR) =   6.87
  TOTAL STREAM AREA(ACRES) =     0.82
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.98

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       15.76     9.28        5.480          4.36
      2        2.98     6.54        6.869          0.82

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       15.56     6.54       6.869
      2       18.14     9.28       5.480

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      18.14   Tc(MIN.) =    9.28
  TOTAL AREA(ACRES) =        5.2
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    610.00 =     781.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    610.00 TO NODE    614.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   854.00  DOWNSTREAM(FEET) =   844.00
  FLOW LENGTH(FEET) =   362.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.0 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.57
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      18.14
  PIPE TRAVEL TIME(MIN.) =   0.52    Tc(MIN.) =    9.80
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    614.00 =    1143.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    614.00 TO NODE    614.00 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) =   5.29
  TOTAL STREAM AREA(ACRES) =     5.18
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     18.14

****************************************************************************
  FLOW PROCESS FROM NODE    617.00 TO NODE    618.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
  UPSTREAM ELEVATION(FEET) =    895.00
  DOWNSTREAM ELEVATION(FEET) =    893.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.776
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.168
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      1.06
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      1.06

****************************************************************************
  FLOW PROCESS FROM NODE    618.00 TO NODE    619.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  9 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  893.00  DOWNSTREAM ELEVATION(FEET) =  865.00
  STREET LENGTH(FEET) =   745.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
```



```
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.53
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =    9.88
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.36
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.41
  STREET FLOW TRAVEL TIME(MIN.) =   2.85   Tc(MIN.) =    7.63
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.221
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.650
  SUBAREA AREA(ACRES) =    4.14      SUBAREA RUNOFF(CFS) =   16.74
  TOTAL AREA(ACRES) =        4.3        PEAK FLOW RATE(CFS) =      17.55

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  12.76
  FLOW VELOCITY(FEET/SEC.) =  5.02   DEPTH*VELOCITY(FT*FT/SEC.) =   1.92
  LONGEST FLOWPATH FROM NODE    617.00 TO NODE    619.00 =     815.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    619.00 TO NODE    614.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   860.00  DOWNSTREAM(FEET) =   848.00
  FLOW LENGTH(FEET) =   302.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.99
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      17.55
  PIPE TRAVEL TIME(MIN.) =   0.39    Tc(MIN.) =    8.01
  LONGEST FLOWPATH FROM NODE    617.00 TO NODE    614.00 =    1117.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    614.00 TO NODE    614.00 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) =   6.03
  TOTAL STREAM AREA(ACRES) =     4.34
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     17.55
```

```
 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       18.14     9.80        5.290          5.18
     2       17.55     8.01        6.025          4.34

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       33.48     8.01       6.025
     2       33.55     9.80       5.290

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      33.55   Tc(MIN.) =    9.80
 TOTAL AREA(ACRES) =        9.5
 LONGEST FLOWPATH FROM NODE    600.00 TO NODE    614.00 =    1143.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    614.00 TO NODE    620.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   848.00  DOWNSTREAM(FEET) =   833.00
 FLOW LENGTH(FEET) =   321.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  14.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.44
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      33.55
 PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =   10.13
 LONGEST FLOWPATH FROM NODE    600.00 TO NODE    620.00 =    1464.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    620.00 TO NODE    620.00 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.) =   10.13
 RAINFALL INTENSITY(INCH/HR) =   5.18
 TOTAL STREAM AREA(ACRES) =     9.52
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     33.55

****************************************************************************
 FLOW PROCESS FROM NODE    623.00 TO NODE    624.00 IS CODE =  21
----------------------------------------------------------------------------
```



```
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
 UPSTREAM ELEVATION(FEET) =    895.50
 DOWNSTREAM ELEVATION(FEET) =    894.80
 ELEVATION DIFFERENCE(FEET) =      0.70
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.777
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.713
 SUBAREA RUNOFF(CFS) =      1.27
 TOTAL AREA(ACRES) =      0.29   TOTAL RUNOFF(CFS) =      1.27

****************************************************************************
 FLOW PROCESS FROM NODE    624.00 TO NODE    625.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  9 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  894.00  DOWNSTREAM ELEVATION(FEET) =  854.00
 STREET LENGTH(FEET) =   555.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.56
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.29
   HALFSTREET FLOOD WIDTH(FEET) =    8.15
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.47
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.58
 STREET FLOW TRAVEL TIME(MIN.) =   1.69   Tc(MIN.) =    8.47
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.815
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.650
 SUBAREA AREA(ACRES) =    3.85      SUBAREA RUNOFF(CFS) =   14.55
 TOTAL AREA(ACRES) =        4.1        PEAK FLOW RATE(CFS) =      15.65

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.65
 FLOW VELOCITY(FEET/SEC.) =  6.24   DEPTH*VELOCITY(FT*FT/SEC.) =   2.12
```

```
 LONGEST FLOWPATH FROM NODE    623.00 TO NODE    625.00 =     625.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    625.00 TO NODE    620.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   849.00  DOWNSTREAM(FEET) =   833.00
 FLOW LENGTH(FEET) =   328.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  11.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.81
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      15.65
 PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =    8.86
 LONGEST FLOWPATH FROM NODE    623.00 TO NODE    620.00 =     953.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    620.00 TO NODE    620.00 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.) =    8.86
 RAINFALL INTENSITY(INCH/HR) =   5.65
 TOTAL STREAM AREA(ACRES) =     4.14
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     15.65

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       33.55    10.13        5.180          9.52
     2       15.65     8.86        5.646          4.14

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       46.43     8.86       5.646
     2       47.90    10.13       5.180

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      47.90   Tc(MIN.) =   10.13
 TOTAL AREA(ACRES) =       13.7
 LONGEST FLOWPATH FROM NODE    600.00 TO NODE    620.00 =    1464.00 FEET.

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



```
 FLOW PROCESS FROM NODE    620.00 TO NODE    630.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   833.00  DOWNSTREAM(FEET) =   831.00
 FLOW LENGTH(FEET) =    89.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.56
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      47.90
 PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   10.24
 LONGEST FLOWPATH FROM NODE    600.00 TO NODE    630.00 =    1553.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    630.00 TO NODE    630.00 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) =   5.14
 TOTAL STREAM AREA(ACRES) =    13.66
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     47.90

****************************************************************************
 FLOW PROCESS FROM NODE    628.00 TO NODE    629.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
 UPSTREAM ELEVATION(FEET) =    866.80
 DOWNSTREAM ELEVATION(FEET) =    866.00
 ELEVATION DIFFERENCE(FEET) =      0.80
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.482
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.908
 SUBAREA RUNOFF(CFS) =      1.35
 TOTAL AREA(ACRES) =      0.30   TOTAL RUNOFF(CFS) =      1.35

****************************************************************************
 FLOW PROCESS FROM NODE    629.00 TO NODE    630.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  8 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  862.00  DOWNSTREAM ELEVATION(FEET) =  836.00
 STREET LENGTH(FEET) =   643.00   CURB HEIGHT(INCHES) =  6.0
```

```
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.24
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.39
   HALFSTREET FLOOD WIDTH(FEET) =   13.40
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.35
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.11
 STREET FLOW TRAVEL TIME(MIN.) =   2.00   Tc(MIN.) =    8.48
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.807
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.650
 SUBAREA AREA(ACRES) =    4.69      SUBAREA RUNOFF(CFS) =   17.70
 TOTAL AREA(ACRES) =        5.0        PEAK FLOW RATE(CFS) =      18.84

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.47   HALFSTREET FLOOD WIDTH(FEET) =  17.15
 FLOW VELOCITY(FEET/SEC.) =  6.16   DEPTH*VELOCITY(FT*FT/SEC.) =   2.89
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L =  643.0 FT WITH ELEVATION-DROP =  26.0 FT, IS   24.6 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    630.00
 LONGEST FLOWPATH FROM NODE    628.00 TO NODE    630.00 =     713.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    630.00 TO NODE    630.00 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.) =    8.48
 RAINFALL INTENSITY(INCH/HR) =   5.81
 TOTAL STREAM AREA(ACRES) =     4.99
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     18.84

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       47.90    10.24        5.144         13.66
```



```
     2       18.84     8.48        5.807          4.99

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc      INTENSITY
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)
     1       61.27     8.48        5.807
     2       64.59    10.24        5.144

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      64.59   Tc(MIN.) =   10.24
 TOTAL AREA(ACRES) =       18.6
 LONGEST FLOWPATH FROM NODE    600.00 TO NODE    630.00 =    1553.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    630.00 TO NODE    631.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   831.00  DOWNSTREAM(FEET) =   830.00
 FLOW LENGTH(FEET) =    88.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  27.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.14
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      64.59
 PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   10.37
 LONGEST FLOWPATH FROM NODE    600.00 TO NODE    631.00 =    1641.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    631.00 TO NODE    631.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

+----------------------------------------------------------------------------+
| EAST SIDE                                                                  |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    870.00 TO NODE    871.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6700
 S.C.S. CURVE NUMBER (AMC II) =   0
```

```
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   200.00
 UPSTREAM ELEVATION(FEET) =    961.00
 DOWNSTREAM ELEVATION(FEET) =    960.00
 ELEVATION DIFFERENCE(FEET) =      1.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.895
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    50.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.638
 SUBAREA RUNOFF(CFS) =      2.27
 TOTAL AREA(ACRES) =      0.51   TOTAL RUNOFF(CFS) =      2.27

****************************************************************************
 FLOW PROCESS FROM NODE    871.00 TO NODE    872.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  9 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  960.00  DOWNSTREAM ELEVATION(FEET) =  935.00
 STREET LENGTH(FEET) =   330.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.96
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.28
   HALFSTREET FLOOD WIDTH(FEET) =    7.80
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.48
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.55
 STREET FLOW TRAVEL TIME(MIN.) =   1.00   Tc(MIN.) =    7.90
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.081
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6700
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.670
 SUBAREA AREA(ACRES) =    2.79      SUBAREA RUNOFF(CFS) =   11.37
 TOTAL AREA(ACRES) =        3.3        PEAK FLOW RATE(CFS) =      13.45

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =   9.88
 FLOW VELOCITY(FEET/SEC.) =  6.14   DEPTH*VELOCITY(FT*FT/SEC.) =   1.99
 LONGEST FLOWPATH FROM NODE    870.00 TO NODE    872.00 =     530.00 FEET.
```



```
****************************************************************************
 FLOW PROCESS FROM NODE    872.00 TO NODE    875.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   925.00  DOWNSTREAM(FEET) =   827.00
 FLOW LENGTH(FEET) =  1115.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.66
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      13.45
 PIPE TRAVEL TIME(MIN.) =   1.12    Tc(MIN.) =    9.02
 LONGEST FLOWPATH FROM NODE    870.00 TO NODE    875.00 =    1645.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    875.00 TO NODE    875.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    9.02
 RAINFALL INTENSITY(INCH/HR) =   5.58
 TOTAL STREAM AREA(ACRES) =     3.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     13.45

****************************************************************************
 FLOW PROCESS FROM NODE    873.00 TO NODE    874.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6700
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   150.00
 UPSTREAM ELEVATION(FEET) =    935.50
 DOWNSTREAM ELEVATION(FEET) =    913.30
 ELEVATION DIFFERENCE(FEET) =     22.20
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.593
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.168
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      1.15
 TOTAL AREA(ACRES) =      0.21   TOTAL RUNOFF(CFS) =      1.15
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    874.00 TO NODE    875.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  9 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  931.30  DOWNSTREAM ELEVATION(FEET) =  837.00
  STREET LENGTH(FEET) =  1454.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      25.53
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.39
    HALFSTREET FLOOD WIDTH(FEET) =   13.32
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.74
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.65
  STREET FLOW TRAVEL TIME(MIN.) =   3.59   Tc(MIN.) =    7.19
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.463
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.670
  SUBAREA AREA(ACRES) =   11.09      SUBAREA RUNOFF(CFS) =   48.02
  TOTAL AREA(ACRES) =       11.3        PEAK FLOW RATE(CFS) =      48.93

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.47   HALFSTREET FLOOD WIDTH(FEET) =  17.26
  FLOW VELOCITY(FEET/SEC.) =  7.90   DEPTH*VELOCITY(FT*FT/SEC.) =   3.72
  LONGEST FLOWPATH FROM NODE    873.00 TO NODE    875.00 =    1604.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    875.00 TO NODE    875.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.19
  RAINFALL INTENSITY(INCH/HR) =   6.46
  TOTAL STREAM AREA(ACRES) =    11.30
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     48.93
```



```
****************************************************************************
  FLOW PROCESS FROM NODE    876.00 TO NODE    879.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6700
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   130.00
  UPSTREAM ELEVATION(FEET) =    935.00
  DOWNSTREAM ELEVATION(FEET) =    926.70
  ELEVATION DIFFERENCE(FEET) =      8.30
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.172
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.168
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.66
  TOTAL AREA(ACRES) =      0.12   TOTAL RUNOFF(CFS) =      0.66

****************************************************************************
  FLOW PROCESS FROM NODE    879.00 TO NODE    875.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  9 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  926.70  DOWNSTREAM ELEVATION(FEET) =  837.00
  STREET LENGTH(FEET) =   912.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.04
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.34
    HALFSTREET FLOOD WIDTH(FEET) =   10.58
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.30
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.47
  STREET FLOW TRAVEL TIME(MIN.) =   2.08   Tc(MIN.) =    6.25
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.069
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6700
```

```
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.670
  SUBAREA AREA(ACRES) =    3.52      SUBAREA RUNOFF(CFS) =   16.67
  TOTAL AREA(ACRES) =        3.6        PEAK FLOW RATE(CFS) =      17.24

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  13.82
  FLOW VELOCITY(FEET/SEC.) =  8.51   DEPTH*VELOCITY(FT*FT/SEC.) =   3.42
  LONGEST FLOWPATH FROM NODE    876.00 TO NODE    875.00 =    1042.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    875.00 TO NODE    875.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.25
  RAINFALL INTENSITY(INCH/HR) =   7.07
  TOTAL STREAM AREA(ACRES) =     3.64
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     17.24

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       13.45     9.02        5.584          3.30
      2       48.93     7.19        6.463         11.30
      3       17.24     6.25        7.069          3.64

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       69.15     6.25       7.069
      2       75.41     7.19       6.463
      3       69.34     9.02       5.584

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      75.41   Tc(MIN.) =    7.19
  TOTAL AREA(ACRES) =       18.2
  LONGEST FLOWPATH FROM NODE    870.00 TO NODE    875.00 =    1645.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    875.00 TO NODE    631.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```



```
  ELEVATION DATA: UPSTREAM(FEET) =   827.00  DOWNSTREAM(FEET) =   825.00
  FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.51
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      75.41
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    7.30
  LONGEST FLOWPATH FROM NODE    870.00 TO NODE    631.00 =    1745.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    631.00 TO NODE    631.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.30
  RAINFALL INTENSITY(INCH/HR) =   6.40
  TOTAL STREAM AREA(ACRES) =    18.24
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     75.41

****************************************************************************
  FLOW PROCESS FROM NODE    640.00 TO NODE    641.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
  UPSTREAM ELEVATION(FEET) =    912.00
  DOWNSTREAM ELEVATION(FEET) =    911.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.343
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.168
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      1.32
  TOTAL AREA(ACRES) =      0.19   TOTAL RUNOFF(CFS) =      1.32

****************************************************************************
  FLOW PROCESS FROM NODE    641.00 TO NODE    642.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION # 10 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  911.00  DOWNSTREAM ELEVATION(FEET) =  840.00
  STREET LENGTH(FEET) =  1195.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 17.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
```

```
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.98
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    7.82
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.79
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.35
  STREET FLOW TRAVEL TIME(MIN.) =   4.16   Tc(MIN.) =    7.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.286
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.850
  SUBAREA AREA(ACRES) =    2.08      SUBAREA RUNOFF(CFS) =   11.11
  TOTAL AREA(ACRES) =        2.3        PEAK FLOW RATE(CFS) =      12.13

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =   9.93
  FLOW VELOCITY(FEET/SEC.) =  5.49   DEPTH*VELOCITY(FT*FT/SEC.) =   1.78
  LONGEST FLOWPATH FROM NODE    640.00 TO NODE    642.00 =    1265.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    642.00 TO NODE    631.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   835.00  DOWNSTREAM(FEET) =   833.00
  FLOW LENGTH(FEET) =    89.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.63
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      12.13
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =    7.66
  LONGEST FLOWPATH FROM NODE    640.00 TO NODE    631.00 =    1354.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    631.00 TO NODE    631.00 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.) =    7.66
```



```
  RAINFALL INTENSITY(INCH/HR) =   6.20
  TOTAL STREAM AREA(ACRES) =     2.27
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     12.13

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       75.41     7.30        6.397         18.24
      2       12.13     7.66        6.204          2.27

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       86.98     7.30       6.397
      2       85.26     7.66       6.204

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      86.98   Tc(MIN.) =    7.30
  TOTAL AREA(ACRES) =       20.5
  LONGEST FLOWPATH FROM NODE    870.00 TO NODE    631.00 =    1745.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    631.00 TO NODE    631.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       86.98     7.30       6.397       20.51
  LONGEST FLOWPATH FROM NODE    870.00 TO NODE    631.00 =    1745.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       64.59    10.37       5.102       18.65
  LONGEST FLOWPATH FROM NODE    600.00 TO NODE    631.00 =    1641.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1     132.45       7.30        6.397
      2     133.95      10.37        5.102

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     133.95   Tc(MIN.) =   10.37
  TOTAL AREA(ACRES) =       39.2
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    631.00 TO NODE    631.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    631.00 TO NODE    648.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   828.00  DOWNSTREAM(FEET) =   763.00
  FLOW LENGTH(FEET) =   970.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  26.43
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     133.95
  PIPE TRAVEL TIME(MIN.) =   0.61    Tc(MIN.) =   10.98
  LONGEST FLOWPATH FROM NODE    870.00 TO NODE    648.00 =    2715.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    648.00 TO NODE    648.00 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.) =   10.98
  RAINFALL INTENSITY(INCH/HR) =   4.92
  TOTAL STREAM AREA(ACRES) =    39.16
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    133.95

****************************************************************************
  FLOW PROCESS FROM NODE    645.00 TO NODE    646.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
  UPSTREAM ELEVATION(FEET) =    854.00
  DOWNSTREAM ELEVATION(FEET) =    850.00
  ELEVATION DIFFERENCE(FEET) =      4.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.791
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.168
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.64
  TOTAL AREA(ACRES) =      0.12   TOTAL RUNOFF(CFS) =      0.64
```



```
****************************************************************************
  FLOW PROCESS FROM NODE    646.00 TO NODE    647.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  9 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  854.00  DOWNSTREAM ELEVATION(FEET) =  788.00
  STREET LENGTH(FEET) =  1005.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      15.70
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.34
    HALFSTREET FLOOD WIDTH(FEET) =   10.86
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.05
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.08
  STREET FLOW TRAVEL TIME(MIN.) =   2.77   Tc(MIN.) =    6.56
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.855
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.650
  SUBAREA AREA(ACRES) =    6.70      SUBAREA RUNOFF(CFS) =   29.85
  TOTAL AREA(ACRES) =        6.8        PEAK FLOW RATE(CFS) =      30.39

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  14.24
  FLOW VELOCITY(FEET/SEC.) =  7.08   DEPTH*VELOCITY(FT*FT/SEC.) =   2.91
  LONGEST FLOWPATH FROM NODE    645.00 TO NODE    647.00 =    1075.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    647.00 TO NODE    648.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   781.00  DOWNSTREAM(FEET) =   770.00
  FLOW LENGTH(FEET) =   184.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.46
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
```

```
 PIPE-FLOW(CFS) =      30.39
 PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =    6.74
 LONGEST FLOWPATH FROM NODE    645.00 TO NODE    648.00 =    1259.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    648.00 TO NODE    648.00 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) =   6.74
 TOTAL STREAM AREA(ACRES) =     6.82
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     30.39

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1      133.95    10.98        4.917         39.16
     2       30.39     6.74        6.739          6.82

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1      112.55     6.74       6.739
     2      156.12    10.98       4.917

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     156.12   Tc(MIN.) =   10.98
 TOTAL AREA(ACRES) =       46.0
 LONGEST FLOWPATH FROM NODE    870.00 TO NODE    648.00 =    2715.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    648.00 TO NODE    653.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   770.00  DOWNSTREAM(FEET) =   765.00
 FLOW LENGTH(FEET) =   131.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  31.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  21.61
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     156.12
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   11.08
 LONGEST FLOWPATH FROM NODE    870.00 TO NODE    653.00 =    2846.00 FEET.
```



```
****************************************************************************
 FLOW PROCESS FROM NODE    653.00 TO NODE    653.00 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.) =   11.08
 RAINFALL INTENSITY(INCH/HR) =   4.89
 TOTAL STREAM AREA(ACRES) =    45.98
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    156.12

****************************************************************************
 FLOW PROCESS FROM NODE    651.00 TO NODE    652.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
 UPSTREAM ELEVATION(FEET) =    839.00
 DOWNSTREAM ELEVATION(FEET) =    837.00
 ELEVATION DIFFERENCE(FEET) =      2.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.653
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.168
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      1.46
 TOTAL AREA(ACRES) =      0.21   TOTAL RUNOFF(CFS) =      1.46

****************************************************************************
 FLOW PROCESS FROM NODE    652.00 TO NODE    653.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  6 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  837.00  DOWNSTREAM ELEVATION(FEET) =  768.00
 STREET LENGTH(FEET) =  1029.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.34
```

```
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.31
   HALFSTREET FLOOD WIDTH(FEET) =    9.04
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.53
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.70
 STREET FLOW TRAVEL TIME(MIN.) =   3.10   Tc(MIN.) =    5.75
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.460
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.850
 SUBAREA AREA(ACRES) =    2.79      SUBAREA RUNOFF(CFS) =   17.69
 TOTAL AREA(ACRES) =        3.0        PEAK FLOW RATE(CFS) =      19.02

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  11.76
 FLOW VELOCITY(FEET/SEC.) =  6.34   DEPTH*VELOCITY(FT*FT/SEC.) =   2.29
 LONGEST FLOWPATH FROM NODE    651.00 TO NODE    653.00 =    1099.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    653.00 TO NODE    653.00 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.) =    5.75
 RAINFALL INTENSITY(INCH/HR) =   7.46
 TOTAL STREAM AREA(ACRES) =     3.00
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     19.02

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1      156.12    11.08        4.888         45.98
     2       19.02     5.75        7.460          3.00

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1      121.32     5.75       7.460
     2      168.59    11.08       4.888

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     168.59   Tc(MIN.) =   11.08
 TOTAL AREA(ACRES) =       49.0
 LONGEST FLOWPATH FROM NODE    870.00 TO NODE    653.00 =    2846.00 FEET.
```



```
****************************************************************************
 FLOW PROCESS FROM NODE    653.00 TO NODE    654.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   768.00  DOWNSTREAM(FEET) =   764.50
 FLOW LENGTH(FEET) =   138.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  45.0 INCH PIPE IS  33.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  19.23
 ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     168.59
 PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   11.20
 LONGEST FLOWPATH FROM NODE    870.00 TO NODE    654.00 =    2984.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    654.00 TO NODE    654.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

+----------------------------------------------------------------------------+
| STREET AA SOUTH                                                            |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    611.00 TO NODE    612.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6700
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   132.00
 UPSTREAM ELEVATION(FEET) =    877.50
 DOWNSTREAM ELEVATION(FEET) =    876.00
 ELEVATION DIFFERENCE(FEET) =      1.50
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.296
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    72.05
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.040
 SUBAREA RUNOFF(CFS) =      1.18
 TOTAL AREA(ACRES) =      0.25   TOTAL RUNOFF(CFS) =      1.18

****************************************************************************
 FLOW PROCESS FROM NODE    612.00 TO NODE    659.00 IS CODE =  62
```

```
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  9 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) =  876.00  DOWNSTREAM ELEVATION(FEET) =  820.00
  STREET LENGTH(FEET) =  1313.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.45
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.40
    HALFSTREET FLOOD WIDTH(FEET) =   13.89
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.59
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.26
  STREET FLOW TRAVEL TIME(MIN.) =   3.91   Tc(MIN.) =   10.21
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.154
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.670
  SUBAREA AREA(ACRES) =    5.85      SUBAREA RUNOFF(CFS) =   20.20
  TOTAL AREA(ACRES) =        6.1        PEAK FLOW RATE(CFS) =      21.07

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.48   HALFSTREET FLOOD WIDTH(FEET) =  17.68
  FLOW VELOCITY(FEET/SEC.) =  6.49   DEPTH*VELOCITY(FT*FT/SEC.) =   3.12
  LONGEST FLOWPATH FROM NODE    611.00 TO NODE    659.00 =    1445.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    659.00 TO NODE    659.00 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) =   5.15
  TOTAL STREAM AREA(ACRES) =     6.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     21.07

****************************************************************************
  FLOW PROCESS FROM NODE    657.00 TO NODE    658.00 IS CODE =  21
```



```
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   178.00
  UPSTREAM ELEVATION(FEET) =    870.00
  DOWNSTREAM ELEVATION(FEET) =    855.00
  ELEVATION DIFFERENCE(FEET) =     15.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.634
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.806
  SUBAREA RUNOFF(CFS) =      0.33
  TOTAL AREA(ACRES) =      0.14   TOTAL RUNOFF(CFS) =      0.33

****************************************************************************
  FLOW PROCESS FROM NODE    658.00 TO NODE    659.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    855.00  DOWNSTREAM(FEET) =    820.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   550.00   CHANNEL SLOPE =  0.0636
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.33
  FLOW VELOCITY(FEET/SEC) =   3.78 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.42   Tc(MIN.) =    9.06
  LONGEST FLOWPATH FROM NODE    657.00 TO NODE    659.00 =     728.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    658.00 TO NODE    659.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.568
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    1.20   SUBAREA RUNOFF(CFS) =    2.34
  TOTAL AREA(ACRES) =        1.3   TOTAL RUNOFF(CFS) =       2.61
  TC(MIN.) =    9.06

****************************************************************************
  FLOW PROCESS FROM NODE    659.00 TO NODE    659.00 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) =   5.57
  TOTAL STREAM AREA(ACRES) =     1.34
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.61

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       21.07    10.21        5.154          6.10
      2        2.61     9.06        5.568          1.34

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       21.30     9.06       5.568
      2       23.48    10.21       5.154

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      23.48   Tc(MIN.) =   10.21
  TOTAL AREA(ACRES) =        7.4
  LONGEST FLOWPATH FROM NODE    611.00 TO NODE    659.00 =    1445.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    659.00 TO NODE    671.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   820.00  DOWNSTREAM(FEET) =   765.00
  FLOW LENGTH(FEET) =   876.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.46
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      23.48
  PIPE TRAVEL TIME(MIN.) =   0.89    Tc(MIN.) =   11.09
  LONGEST FLOWPATH FROM NODE    611.00 TO NODE    671.00 =    2321.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    659.00 TO NODE    671.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.885
  *USER SPECIFIED(SUBAREA):
```



```
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6400
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6195
  SUBAREA AREA(ACRES) =    2.59   SUBAREA RUNOFF(CFS) =    8.10
  TOTAL AREA(ACRES) =       10.0   TOTAL RUNOFF(CFS) =      30.35
  TC(MIN.) =   11.09

****************************************************************************
  FLOW PROCESS FROM NODE    671.00 TO NODE    671.00 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.) =   11.09
  RAINFALL INTENSITY(INCH/HR) =   4.88
  TOTAL STREAM AREA(ACRES) =    10.03
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     30.35

****************************************************************************
  FLOW PROCESS FROM NODE    673.00 TO NODE    674.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   145.00
  UPSTREAM ELEVATION(FEET) =    821.00
  DOWNSTREAM ELEVATION(FEET) =    790.00
  ELEVATION DIFFERENCE(FEET) =     31.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.061
  SUBAREA RUNOFF(CFS) =      0.47
  TOTAL AREA(ACRES) =      0.19   TOTAL RUNOFF(CFS) =      0.47

****************************************************************************
  FLOW PROCESS FROM NODE    674.00 TO NODE    675.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    790.00  DOWNSTREAM(FEET) =    768.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   386.00   CHANNEL SLOPE =  0.0570
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.47
  FLOW VELOCITY(FEET/SEC) =   3.58 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

```
 TRAVEL TIME(MIN.) =   1.80   Tc(MIN.) =    8.06
 LONGEST FLOWPATH FROM NODE    673.00 TO NODE    675.00 =     531.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    674.00 TO NODE    675.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.001
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .5200
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5027
 SUBAREA AREA(ACRES) =    1.68   SUBAREA RUNOFF(CFS) =    5.24
 TOTAL AREA(ACRES) =        1.9   TOTAL RUNOFF(CFS) =       5.64
 TC(MIN.) =    8.06

****************************************************************************
 FLOW PROCESS FROM NODE    675.00 TO NODE    671.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   768.00  DOWNSTREAM(FEET) =   765.00
 FLOW LENGTH(FEET) =    58.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.86
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.64
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    8.15
 LONGEST FLOWPATH FROM NODE    673.00 TO NODE    671.00 =     589.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    671.00 TO NODE    671.00 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.) =    8.15
 RAINFALL INTENSITY(INCH/HR) =   5.96
 TOTAL STREAM AREA(ACRES) =     1.87
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.64

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       30.35    11.09        4.885         10.03
     2        5.64     8.15        5.959          1.87
```



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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc      INTENSITY
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)
     1       30.52     8.15        5.959
     2       34.98    11.09        4.885

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      34.98   Tc(MIN.) =   11.09
 TOTAL AREA(ACRES) =       11.9
 LONGEST FLOWPATH FROM NODE    611.00 TO NODE    671.00 =    2321.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    671.00 TO NODE    654.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   765.00  DOWNSTREAM(FEET) =   764.50
 FLOW LENGTH(FEET) =    43.26   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.76
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      34.98
 PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =   11.17
 LONGEST FLOWPATH FROM NODE    611.00 TO NODE    654.00 =    2364.26 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    654.00 TO NODE    654.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY     AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)   (ACRE)
     1       34.98    11.17        4.864        11.90
 LONGEST FLOWPATH FROM NODE    611.00 TO NODE    654.00 =    2364.26 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY     AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)   (ACRE)
     1      168.59    11.20        4.854        48.98
 LONGEST FLOWPATH FROM NODE    870.00 TO NODE    654.00 =    2984.00 FEET.

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

```
     1     203.03      11.17        4.864
     2     203.49      11.20        4.854

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     203.49   Tc(MIN.) =   11.20
  TOTAL AREA(ACRES) =       60.9

****************************************************************************
  FLOW PROCESS FROM NODE    654.00 TO NODE    654.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    654.00 TO NODE    786.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   740.00  DOWNSTREAM(FEET) =   738.00
  FLOW LENGTH(FEET) =   250.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  44.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.08
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     203.49
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   11.52
  LONGEST FLOWPATH FROM NODE    870.00 TO NODE    786.00 =    3234.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    786.00 TO NODE    786.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

+--------------------------------------------------------------------------+
| BASIN 6 UPSTREAM EAST SIDE                                               |
| 700 SERIES                                                               |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    750.00 TO NODE    751.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
  UPSTREAM ELEVATION(FEET) =    999.05
  DOWNSTREAM ELEVATION(FEET) =    998.35
```



```
  ELEVATION DIFFERENCE(FEET) =      0.70
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.777
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.713
  SUBAREA RUNOFF(CFS) =      0.79
  TOTAL AREA(ACRES) =      0.18   TOTAL RUNOFF(CFS) =      0.79

****************************************************************************
  FLOW PROCESS FROM NODE    751.00 TO NODE    752.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  9 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  998.00  DOWNSTREAM ELEVATION(FEET) =  932.50
  STREET LENGTH(FEET) =   775.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.95
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    7.56
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.72
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.59
  STREET FLOW TRAVEL TIME(MIN.) =   2.26   Tc(MIN.) =    9.03
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.577
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.650
  SUBAREA AREA(ACRES) =    1.74      SUBAREA RUNOFF(CFS) =    6.31
  TOTAL AREA(ACRES) =        1.9        PEAK FLOW RATE(CFS) =       6.96

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =   9.81
  FLOW VELOCITY(FEET/SEC.) =  6.44   DEPTH*VELOCITY(FT*FT/SEC.) =   2.08
  LONGEST FLOWPATH FROM NODE    750.00 TO NODE    752.00 =     845.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    752.00 TO NODE    763.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
  ELEVATION DATA: UPSTREAM(FEET) =   937.50  DOWNSTREAM(FEET) =   932.50
  FLOW LENGTH(FEET) =   264.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   7.95
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.96
  PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =    9.59
  LONGEST FLOWPATH FROM NODE    750.00 TO NODE    763.00 =    1109.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    763.00 TO NODE    763.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.59
  RAINFALL INTENSITY(INCH/HR) =   5.37
  TOTAL STREAM AREA(ACRES) =     1.92
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.96

****************************************************************************
  FLOW PROCESS FROM NODE    760.00 TO NODE    761.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    998.00
  DOWNSTREAM ELEVATION(FEET) =    992.00
  ELEVATION DIFFERENCE(FEET) =      6.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.458
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.168
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      1.27
  TOTAL AREA(ACRES) =      0.24   TOTAL RUNOFF(CFS) =      1.27

****************************************************************************
  FLOW PROCESS FROM NODE    761.00 TO NODE    762.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  9 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  992.00  DOWNSTREAM ELEVATION(FEET) =  937.00
  STREET LENGTH(FEET) =  1024.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
```



```
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.28
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.33
    HALFSTREET FLOOD WIDTH(FEET) =   10.23
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.27
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.74
  STREET FLOW TRAVEL TIME(MIN.) =   3.24   Tc(MIN.) =    7.70
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.184
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.650
  SUBAREA AREA(ACRES) =    5.40      SUBAREA RUNOFF(CFS) =   21.71
  TOTAL AREA(ACRES) =        5.6        PEAK FLOW RATE(CFS) =      22.67

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  13.18
  FLOW VELOCITY(FEET/SEC.) =  6.11   DEPTH*VELOCITY(FT*FT/SEC.) =   2.38
  LONGEST FLOWPATH FROM NODE    760.00 TO NODE    762.00 =    1124.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    762.00 TO NODE    763.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   937.50  DOWNSTREAM(FEET) =   937.00
  FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.06
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      22.67
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    7.75
  LONGEST FLOWPATH FROM NODE    760.00 TO NODE    763.00 =    1154.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    763.00 TO NODE    763.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.75
```

```
 RAINFALL INTENSITY(INCH/HR) =   6.16
 TOTAL STREAM AREA(ACRES) =     5.64
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     22.67

****************************************************************************
 FLOW PROCESS FROM NODE    755.00 TO NODE    756.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
 UPSTREAM ELEVATION(FEET) =    999.75
 DOWNSTREAM ELEVATION(FEET) =    999.05
 ELEVATION DIFFERENCE(FEET) =      0.70
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.777
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.713
 SUBAREA RUNOFF(CFS) =      0.87
 TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.87

****************************************************************************
 FLOW PROCESS FROM NODE    756.00 TO NODE    757.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  9 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  999.00  DOWNSTREAM ELEVATION(FEET) =  937.00
 STREET LENGTH(FEET) =  1125.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.59
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.31
   HALFSTREET FLOOD WIDTH(FEET) =    8.97
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.98
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.52
 STREET FLOW TRAVEL TIME(MIN.) =   3.77   Tc(MIN.) =   10.54
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.048
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6500
 S.C.S. CURVE NUMBER (AMC II) =   0
```



```
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.650
 SUBAREA AREA(ACRES) =    2.24      SUBAREA RUNOFF(CFS) =    7.35
 TOTAL AREA(ACRES) =        2.4        PEAK FLOW RATE(CFS) =       8.01

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  11.36
 FLOW VELOCITY(FEET/SEC.) =  5.69   DEPTH*VELOCITY(FT*FT/SEC.) =   2.01
 LONGEST FLOWPATH FROM NODE    755.00 TO NODE    757.00 =    1195.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    757.00 TO NODE    763.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   937.50  DOWNSTREAM(FEET) =   937.00
 FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.83
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       8.01
 PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   10.61
 LONGEST FLOWPATH FROM NODE    755.00 TO NODE    763.00 =    1225.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    763.00 TO NODE    763.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION(MIN.) =   10.61
 RAINFALL INTENSITY(INCH/HR) =   5.03
 TOTAL STREAM AREA(ACRES) =     2.44
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.01

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
    1         6.96     9.59        5.367          1.92
    2        22.67     7.75        6.158          5.64
    3         8.01    10.61        5.028          2.44

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  3 STREAMS.

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

```
      1       34.14     7.75       6.158
      2       33.95     9.59       5.367
      3       33.04    10.61       5.028

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      34.14   Tc(MIN.) =    7.75
  TOTAL AREA(ACRES) =       10.0
  LONGEST FLOWPATH FROM NODE    755.00 TO NODE    763.00 =    1225.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    763.00 TO NODE    764.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   932.00  DOWNSTREAM(FEET) =   931.00
  FLOW LENGTH(FEET) =    99.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.19
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      34.14
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =    7.93
  LONGEST FLOWPATH FROM NODE    755.00 TO NODE    764.00 =    1324.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    764.00 TO NODE    764.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.93
  RAINFALL INTENSITY(INCH/HR) =   6.07
  TOTAL STREAM AREA(ACRES) =    10.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     34.14

****************************************************************************
  FLOW PROCESS FROM NODE    767.00 TO NODE    768.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
  UPSTREAM ELEVATION(FEET) =    992.00
  DOWNSTREAM ELEVATION(FEET) =    991.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.017
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.248
  SUBAREA RUNOFF(CFS) =      1.04
```



```
  TOTAL AREA(ACRES) =      0.22   TOTAL RUNOFF(CFS) =      1.04

****************************************************************************
  FLOW PROCESS FROM NODE    768.00 TO NODE    769.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  9 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  991.00  DOWNSTREAM ELEVATION(FEET) =  943.00
  STREET LENGTH(FEET) =   679.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.42
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    8.15
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.38
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.56
  STREET FLOW TRAVEL TIME(MIN.) =   2.10   Tc(MIN.) =    8.12
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.974
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.650
  SUBAREA AREA(ACRES) =    3.78      SUBAREA RUNOFF(CFS) =   14.68
  TOTAL AREA(ACRES) =        4.0        PEAK FLOW RATE(CFS) =      15.53

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.65
  FLOW VELOCITY(FEET/SEC.) =  6.20   DEPTH*VELOCITY(FT*FT/SEC.) =   2.10
  LONGEST FLOWPATH FROM NODE    767.00 TO NODE    769.00 =     749.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    769.00 TO NODE    764.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   932.00  DOWNSTREAM(FEET) =   931.00
  FLOW LENGTH(FEET) =    73.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.45
```

```
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      15.53
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    8.26
  LONGEST FLOWPATH FROM NODE    767.00 TO NODE    764.00 =     822.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    764.00 TO NODE    764.00 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.) =    8.26
  RAINFALL INTENSITY(INCH/HR) =   5.91
  TOTAL STREAM AREA(ACRES) =     4.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     15.53

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       34.14     7.93        6.068         10.00
      2       15.53     8.26        5.906          4.00

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       49.04     7.93        6.068
      2       48.76     8.26        5.906

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      49.04   Tc(MIN.) =    7.93
  TOTAL AREA(ACRES) =       14.0
  LONGEST FLOWPATH FROM NODE    755.00 TO NODE    764.00 =    1324.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    764.00 TO NODE    775.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   931.00  DOWNSTREAM(FEET) =   914.00
  FLOW LENGTH(FEET) =   200.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.53
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      49.04
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =    8.07
```



```
  LONGEST FLOWPATH FROM NODE    755.00 TO NODE    775.00 =    1524.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    775.00 TO NODE    775.00 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.) =    8.07
  RAINFALL INTENSITY(INCH/HR) =   6.00
  TOTAL STREAM AREA(ACRES) =    14.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     49.04

****************************************************************************
  FLOW PROCESS FROM NODE    778.00 TO NODE    779.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    970.00
  DOWNSTREAM ELEVATION(FEET) =    960.00
  ELEVATION DIFFERENCE(FEET) =     10.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.760
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.168
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.64
  TOTAL AREA(ACRES) =      0.12   TOTAL RUNOFF(CFS) =      0.64

****************************************************************************
  FLOW PROCESS FROM NODE    779.00 TO NODE    780.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION # 11 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  960.00  DOWNSTREAM ELEVATION(FEET) =  930.00
  STREET LENGTH(FEET) =   639.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 14.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   7.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

```
   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.08
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.32
   HALFSTREET FLOOD WIDTH(FEET) =    9.71
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.79
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.53
  STREET FLOW TRAVEL TIME(MIN.) =   2.22   Tc(MIN.) =    5.98
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.274
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.650
  SUBAREA AREA(ACRES) =    1.87      SUBAREA RUNOFF(CFS) =    8.84
  TOTAL AREA(ACRES) =        2.0        PEAK FLOW RATE(CFS) =       9.41

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  12.61
  FLOW VELOCITY(FEET/SEC.) =  5.51   DEPTH*VELOCITY(FT*FT/SEC.) =   2.09
  LONGEST FLOWPATH FROM NODE    778.00 TO NODE    780.00 =     739.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    780.00 TO NODE    775.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   925.00  DOWNSTREAM(FEET) =   920.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.22
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.41
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    6.02
  LONGEST FLOWPATH FROM NODE    778.00 TO NODE    775.00 =     779.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    775.00 TO NODE    775.00 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.) =    6.02
  RAINFALL INTENSITY(INCH/HR) =   7.24
  TOTAL STREAM AREA(ACRES) =     1.99
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.41

  ** CONFLUENCE DATA **
```



```
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       49.04     8.07        5.996         14.00
      2        9.41     6.02        7.244          1.99

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       50.00     6.02       7.244
      2       56.82     8.07       5.996

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      56.82   Tc(MIN.) =    8.07
  TOTAL AREA(ACRES) =       16.0
  LONGEST FLOWPATH FROM NODE    755.00 TO NODE    775.00 =    1524.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    775.00 TO NODE    785.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   918.00  DOWNSTREAM(FEET) =   858.00
  FLOW LENGTH(FEET) =   648.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.96
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      56.82
  PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =    8.52
  LONGEST FLOWPATH FROM NODE    755.00 TO NODE    785.00 =    2172.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    785.00 TO NODE    785.00 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.) =    8.52
  RAINFALL INTENSITY(INCH/HR) =   5.79
  TOTAL STREAM AREA(ACRES) =    15.99
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     56.82

****************************************************************************
  FLOW PROCESS FROM NODE    783.00 TO NODE    784.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
```

```
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   130.00
 UPSTREAM ELEVATION(FEET) =    940.40
 DOWNSTREAM ELEVATION(FEET) =    939.00
 ELEVATION DIFFERENCE(FEET) =      1.40
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.427
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    66.15
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.946
 SUBAREA RUNOFF(CFS) =      1.08
 TOTAL AREA(ACRES) =      0.24   TOTAL RUNOFF(CFS) =      1.08

****************************************************************************
 FLOW PROCESS FROM NODE    784.00 TO NODE    785.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  7 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  939.00  DOWNSTREAM ELEVATION(FEET) =  863.00
 STREET LENGTH(FEET) =  1176.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 16.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   8.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.17
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.27
   HALFSTREET FLOOD WIDTH(FEET) =    7.21
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.83
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.31
 STREET FLOW TRAVEL TIME(MIN.) =   4.06   Tc(MIN.) =   10.49
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.066
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.650
 SUBAREA AREA(ACRES) =    3.04      SUBAREA RUNOFF(CFS) =   10.01
 TOTAL AREA(ACRES) =        3.3        PEAK FLOW RATE(CFS) =      10.80

 END OF SUBAREA STREET FLOW HYDRAULICS:
```



```
 DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   9.28
 FLOW VELOCITY(FEET/SEC.) =  5.51   DEPTH*VELOCITY(FT*FT/SEC.) =   1.72
 LONGEST FLOWPATH FROM NODE    783.00 TO NODE    785.00 =    1306.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    785.00 TO NODE    785.00 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.) =   10.49
 RAINFALL INTENSITY(INCH/HR) =   5.07
 TOTAL STREAM AREA(ACRES) =     3.28
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.80

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       56.82     8.52        5.790         15.99
     2       10.80    10.49        5.066          3.28

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       65.60     8.52       5.790
     2       60.52    10.49       5.066

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      65.60   Tc(MIN.) =    8.52
 TOTAL AREA(ACRES) =       19.3
 LONGEST FLOWPATH FROM NODE    755.00 TO NODE    785.00 =    2172.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    785.00 TO NODE    786.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   858.00  DOWNSTREAM(FEET) =   767.00
 FLOW LENGTH(FEET) =  1269.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  18.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  22.64
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      65.60
 PIPE TRAVEL TIME(MIN.) =   0.93    Tc(MIN.) =    9.46
 LONGEST FLOWPATH FROM NODE    755.00 TO NODE    786.00 =    3441.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    786.00 TO NODE    786.00 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.) =    9.46
  RAINFALL INTENSITY(INCH/HR) =   5.41
  TOTAL STREAM AREA(ACRES) =    19.27
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     65.60

****************************************************************************
  FLOW PROCESS FROM NODE    789.00 TO NODE    790.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
  UPSTREAM ELEVATION(FEET) =    863.50
  DOWNSTREAM ELEVATION(FEET) =    861.00
  ELEVATION DIFFERENCE(FEET) =      2.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.463
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.168
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.76
  TOTAL AREA(ACRES) =      0.11   TOTAL RUNOFF(CFS) =      0.76

****************************************************************************
  FLOW PROCESS FROM NODE    790.00 TO NODE    791.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  7 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  861.00  DOWNSTREAM ELEVATION(FEET) =  765.50
  STREET LENGTH(FEET) =  1296.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 16.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   8.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.84
```



```
  STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
  STREET FLOW DEPTH(FEET) =  0.28
  HALFSTREET FLOOD WIDTH(FEET) =    7.82
  AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.37
  PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.52
 STREET FLOW TRAVEL TIME(MIN.) =   4.02   Tc(MIN.) =    6.49
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.905
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .8500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.850
 SUBAREA AREA(ACRES) =    2.38      SUBAREA RUNOFF(CFS) =   13.97
 TOTAL AREA(ACRES) =        2.5        PEAK FLOW RATE(CFS) =      14.61

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  10.28
 FLOW VELOCITY(FEET/SEC.) =  6.22   DEPTH*VELOCITY(FT*FT/SEC.) =   2.06
 LONGEST FLOWPATH FROM NODE    789.00 TO NODE    791.00 =    1366.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    791.00 TO NODE    786.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   765.50  DOWNSTREAM(FEET) =   765.00
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.38
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.61
  PIPE TRAVEL TIME(MIN.) =   0.37    Tc(MIN.) =    6.86
  LONGEST FLOWPATH FROM NODE    789.00 TO NODE    786.00 =    1486.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    786.00 TO NODE    786.00 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.) =    6.86
  RAINFALL INTENSITY(INCH/HR) =   6.66
  TOTAL STREAM AREA(ACRES) =     2.49
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     14.61

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       65.60     9.46        5.414         19.27
```

```
    2       14.61     6.86        6.661          2.49

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       67.94     6.86       6.661
      2       77.48     9.46       5.414

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      77.48   Tc(MIN.) =    9.46
  TOTAL AREA(ACRES) =       21.8
  LONGEST FLOWPATH FROM NODE    755.00 TO NODE    786.00 =    3441.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    786.00 TO NODE    786.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       77.48     9.46       5.414       21.76
  LONGEST FLOWPATH FROM NODE    755.00 TO NODE    786.00 =    3441.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1      203.49    11.52       4.767       60.88
  LONGEST FLOWPATH FROM NODE    870.00 TO NODE    786.00 =    3234.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1     244.53       9.46       5.414
      2     271.71      11.52       4.767

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     271.71   Tc(MIN.) =   11.52
  TOTAL AREA(ACRES) =       82.6

****************************************************************************
  FLOW PROCESS FROM NODE    786.00 TO NODE    786.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

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



```
  FLOW PROCESS FROM NODE    786.00 TO NODE      6.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   736.00  DOWNSTREAM(FEET) =   734.00
  FLOW LENGTH(FEET) =   113.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  57.0 INCH PIPE IS  43.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  18.86
  ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     271.71
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   11.62
  LONGEST FLOWPATH FROM NODE    755.00 TO NODE      6.00 =    3554.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    786.00 TO NODE      6.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.741
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6526
  SUBAREA AREA(ACRES) =    3.35   SUBAREA RUNOFF(CFS) =    5.56
  TOTAL AREA(ACRES) =       86.0   TOTAL RUNOFF(CFS) =     271.71
  TC(MIN.) =   11.62
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

+--------------------------------------------------------------------------+
| APPLY CODE 7 IN BASIN 6 FOR ATTENUATED OUTFLOW                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      6.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  21.62   RAIN INTENSITY(INCH/HOUR) =  3.18
  TOTAL AREA(ACRES) =    86.00   TOTAL RUNOFF(CFS) =    139.60

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE     26.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   734.00  DOWNSTREAM(FEET) =   732.40
```

```
 FLOW LENGTH(FEET) =    85.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  45.0 INCH PIPE IS  32.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.47
 ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     139.60
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   21.71
 LONGEST FLOWPATH FROM NODE    755.00 TO NODE     26.00 =    3639.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     26.00 TO NODE     26.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1      139.60    21.71       3.168       86.00
 LONGEST FLOWPATH FROM NODE    755.00 TO NODE     26.00 =    3639.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1      315.54    16.78       3.740      253.33
 LONGEST FLOWPATH FROM NODE    850.00 TO NODE     26.00 =    7171.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc      INTENSITY
 NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1     423.48      16.78        3.740
     2     406.91      21.71        3.168

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     423.48   Tc(MIN.) =   16.78
 TOTAL AREA(ACRES) =      339.3

****************************************************************************
 FLOW PROCESS FROM NODE     26.00 TO NODE     26.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     26.00 TO NODE     27.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   732.40  DOWNSTREAM(FEET) =   700.00
 FLOW LENGTH(FEET) =  1091.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  47.5 INCHES
```



```
 PIPE-FLOW VELOCITY(FEET/SEC.) =  25.38
 ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     423.48
 PIPE TRAVEL TIME(MIN.) =   0.72    Tc(MIN.) =   17.50
 LONGEST FLOWPATH FROM NODE    850.00 TO NODE     27.00 =    8262.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

+--------------------------------------------------------------------------+
| NODE 27 UPSTREAM BYPASS                                                  |
| FROM EAST                                                                |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    887.00 TO NODE    888.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   136.00
 UPSTREAM ELEVATION(FEET) =    980.00
 DOWNSTREAM ELEVATION(FEET) =    960.00
 ELEVATION DIFFERENCE(FEET) =     20.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.061
 SUBAREA RUNOFF(CFS) =      0.79
 TOTAL AREA(ACRES) =      0.32   TOTAL RUNOFF(CFS) =      0.79

****************************************************************************
 FLOW PROCESS FROM NODE    888.00 TO NODE    889.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    960.00  DOWNSTREAM(FEET) =    850.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   363.00   CHANNEL SLOPE =  0.3030
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.79
 FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```

```
  TRAVEL TIME(MIN.) =   1.28   Tc(MIN.) =    7.54
  LONGEST FLOWPATH FROM NODE    887.00 TO NODE    889.00 =     499.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    888.00 TO NODE    889.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.265
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    2.75   SUBAREA RUNOFF(CFS) =    6.03
  TOTAL AREA(ACRES) =        3.1   TOTAL RUNOFF(CFS) =       6.73
  TC(MIN.) =    7.54

****************************************************************************
  FLOW PROCESS FROM NODE    889.00 TO NODE    890.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   850.00  DOWNSTREAM(FEET) =   815.00
  FLOW LENGTH(FEET) =   201.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   4.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.64
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.73
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =    7.73
  LONGEST FLOWPATH FROM NODE    887.00 TO NODE    890.00 =     700.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    890.00 TO NODE    890.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.73
  RAINFALL INTENSITY(INCH/HR) =   6.17
  TOTAL STREAM AREA(ACRES) =     3.07
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.73

****************************************************************************
  FLOW PROCESS FROM NODE    882.00 TO NODE    883.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
```



```
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1530.00
  DOWNSTREAM ELEVATION(FEET) =   1520.00
  ELEVATION DIFFERENCE(FEET) =     10.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.061
  SUBAREA RUNOFF(CFS) =      0.49
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.49

****************************************************************************
  FLOW PROCESS FROM NODE    883.00 TO NODE    884.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1520.00  DOWNSTREAM(FEET) =   1180.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   987.00   CHANNEL SLOPE =  0.3445
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.49
  FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.47   Tc(MIN.) =    9.73
  LONGEST FLOWPATH FROM NODE    882.00 TO NODE    884.00 =    1087.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    883.00 TO NODE    884.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.315
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   12.73   SUBAREA RUNOFF(CFS) =   23.68
  TOTAL AREA(ACRES) =       12.9   TOTAL RUNOFF(CFS) =      24.05
  TC(MIN.) =    9.73

****************************************************************************
  FLOW PROCESS FROM NODE    884.00 TO NODE    885.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1180.00  DOWNSTREAM(FEET) =    940.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1011.00   CHANNEL SLOPE =  0.2374
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      24.05
```

```
  FLOW VELOCITY(FEET/SEC) =   9.96 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.69   Tc(MIN.) =   11.43
  LONGEST FLOWPATH FROM NODE    882.00 TO NODE    885.00 =    2098.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    884.00 TO NODE    885.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.793
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   22.07   SUBAREA RUNOFF(CFS) =   37.02
  TOTAL AREA(ACRES) =       35.0   TOTAL RUNOFF(CFS) =      58.71
  TC(MIN.) =   11.43

****************************************************************************
  FLOW PROCESS FROM NODE    885.00 TO NODE    886.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    940.00  DOWNSTREAM(FEET) =    830.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   641.00   CHANNEL SLOPE =  0.1716
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =      58.71
  FLOW VELOCITY(FEET/SEC) =  12.82 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   0.83   Tc(MIN.) =   12.26
  LONGEST FLOWPATH FROM NODE    882.00 TO NODE    886.00 =    2739.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    885.00 TO NODE    886.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.580
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   25.23   SUBAREA RUNOFF(CFS) =   40.45
  TOTAL AREA(ACRES) =       60.2   TOTAL RUNOFF(CFS) =      96.55
  TC(MIN.) =   12.26

****************************************************************************
  FLOW PROCESS FROM NODE    886.00 TO NODE    890.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```



```
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   820.00  DOWNSTREAM(FEET) =   815.00
  FLOW LENGTH(FEET) =   174.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  26.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.58
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      96.55
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =   12.42
  LONGEST FLOWPATH FROM NODE    882.00 TO NODE    890.00 =    2913.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    890.00 TO NODE    890.00 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.) =   12.42
  RAINFALL INTENSITY(INCH/HR) =   4.54
  TOTAL STREAM AREA(ACRES) =    60.23
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     96.55

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        6.73     7.73        6.166          3.07
      2       96.55    12.42        4.541         60.23

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       66.82     7.73       6.166
      2      101.51    12.42       4.541

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     101.51   Tc(MIN.) =   12.42
  TOTAL AREA(ACRES) =       63.3
  LONGEST FLOWPATH FROM NODE    882.00 TO NODE    890.00 =    2913.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    890.00 TO NODE    891.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   815.00  DOWNSTREAM(FEET) =   765.00
  FLOW LENGTH(FEET) =   429.00   MANNING'S N =  0.013
```

```
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  29.55
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     101.51
 PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =   12.67
 LONGEST FLOWPATH FROM NODE    882.00 TO NODE    891.00 =    3342.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    891.00 TO NODE    891.00 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.) =   12.67
 RAINFALL INTENSITY(INCH/HR) =   4.48
 TOTAL STREAM AREA(ACRES) =    63.30
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    101.51

****************************************************************************
 FLOW PROCESS FROM NODE    891.10 TO NODE    891.20 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   147.00
 UPSTREAM ELEVATION(FEET) =    940.00
 DOWNSTREAM ELEVATION(FEET) =    920.00
 ELEVATION DIFFERENCE(FEET) =     20.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.061
 SUBAREA RUNOFF(CFS) =      0.74
 TOTAL AREA(ACRES) =      0.30   TOTAL RUNOFF(CFS) =      0.74

****************************************************************************
 FLOW PROCESS FROM NODE    891.20 TO NODE    891.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    920.00  DOWNSTREAM(FEET) =    770.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   583.00   CHANNEL SLOPE =  0.2573
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.74
```



```
 FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.05   Tc(MIN.) =    8.32
 LONGEST FLOWPATH FROM NODE    891.10 TO NODE    891.00 =     730.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    891.20 TO NODE    891.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.883
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =    9.98   SUBAREA RUNOFF(CFS) =   20.55
 TOTAL AREA(ACRES) =      10.3   TOTAL RUNOFF(CFS) =      21.17
 TC(MIN.) =    8.32

****************************************************************************
 FLOW PROCESS FROM NODE    891.00 TO NODE    891.00 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.) =    8.32
 RAINFALL INTENSITY(INCH/HR) =   5.88
 TOTAL STREAM AREA(ACRES) =    10.28
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     21.17

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1      101.51    12.67        4.485         63.30
     2       21.17     8.32        5.883         10.28

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       98.55     8.32       5.883
     2      117.65    12.67       4.485

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     117.65   Tc(MIN.) =   12.67
 TOTAL AREA(ACRES) =       73.6
 LONGEST FLOWPATH FROM NODE    882.00 TO NODE    891.00 =    3342.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    891.00 TO NODE    892.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   770.00  DOWNSTREAM(FEET) =   755.00
  FLOW LENGTH(FEET) =   588.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  29.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.57
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     117.65
  PIPE TRAVEL TIME(MIN.) =   0.56    Tc(MIN.) =   13.22
  LONGEST FLOWPATH FROM NODE    882.00 TO NODE    892.00 =    3930.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    892.00 TO NODE    892.00 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.) =   13.22
  RAINFALL INTENSITY(INCH/HR) =   4.36
  TOTAL STREAM AREA(ACRES) =    73.58
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    117.65

****************************************************************************
  FLOW PROCESS FROM NODE    892.10 TO NODE    892.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   260.00
  UPSTREAM ELEVATION(FEET) =    980.00
  DOWNSTREAM ELEVATION(FEET) =    950.00
  ELEVATION DIFFERENCE(FEET) =     30.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.061
  SUBAREA RUNOFF(CFS) =      1.85
  TOTAL AREA(ACRES) =      0.75   TOTAL RUNOFF(CFS) =      1.85

****************************************************************************
  FLOW PROCESS FROM NODE    892.20 TO NODE    892.00 IS CODE =  52
----------------------------------------------------------------------------
```



```
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    950.00  DOWNSTREAM(FEET) =    760.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1059.00   CHANNEL SLOPE =  0.1794
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.85
  FLOW VELOCITY(FEET/SEC) =   5.36 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.29   Tc(MIN.) =    9.56
  LONGEST FLOWPATH FROM NODE    892.10 TO NODE    892.00 =    1319.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    892.20 TO NODE    892.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.377
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    8.52   SUBAREA RUNOFF(CFS) =   16.03
  TOTAL AREA(ACRES) =        9.3   TOTAL RUNOFF(CFS) =      17.44
  TC(MIN.) =    9.56

****************************************************************************
  FLOW PROCESS FROM NODE    892.00 TO NODE    892.00 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.) =    9.56
  RAINFALL INTENSITY(INCH/HR) =   5.38
  TOTAL STREAM AREA(ACRES) =     9.27
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     17.44

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      117.65    13.22        4.362         73.58
      2       17.44     9.56        5.377          9.27

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      112.89     9.56       5.377
```

```
     2      131.80    13.22       4.362

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     131.80   Tc(MIN.) =   13.22
  TOTAL AREA(ACRES) =       82.9
  LONGEST FLOWPATH FROM NODE    882.00 TO NODE    892.00 =    3930.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    892.00 TO NODE    893.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   760.00  DOWNSTREAM(FEET) =   755.00
  FLOW LENGTH(FEET) =   429.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  48.0 INCH PIPE IS  34.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.55
  ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     131.80
  PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =   13.75
  LONGEST FLOWPATH FROM NODE    882.00 TO NODE    893.00 =    4359.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    893.00 TO NODE    893.00 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.) =   13.75
  RAINFALL INTENSITY(INCH/HR) =   4.25
  TOTAL STREAM AREA(ACRES) =    82.85
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    131.80

****************************************************************************
  FLOW PROCESS FROM NODE    893.10 TO NODE    893.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   140.00
  UPSTREAM ELEVATION(FEET) =    910.00
  DOWNSTREAM ELEVATION(FEET) =    875.00
  ELEVATION DIFFERENCE(FEET) =     35.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
```



```
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.061
  SUBAREA RUNOFF(CFS) =      0.77
  TOTAL AREA(ACRES) =      0.31   TOTAL RUNOFF(CFS) =      0.77

****************************************************************************
  FLOW PROCESS FROM NODE    893.20 TO NODE    893.30 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    875.00  DOWNSTREAM(FEET) =    790.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   412.00   CHANNEL SLOPE =  0.2063
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.77
  FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   1.45   Tc(MIN.) =    7.71
  LONGEST FLOWPATH FROM NODE    893.10 TO NODE    893.30 =     552.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    893.20 TO NODE    893.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.175
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    1.49   SUBAREA RUNOFF(CFS) =    3.22
  TOTAL AREA(ACRES) =        1.8   TOTAL RUNOFF(CFS) =       3.89
  TC(MIN.) =    7.71

****************************************************************************
  FLOW PROCESS FROM NODE    893.30 TO NODE    893.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   790.00  DOWNSTREAM(FEET) =   755.00
  FLOW LENGTH(FEET) =   128.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.63
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.89
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =    7.84
  LONGEST FLOWPATH FROM NODE    893.10 TO NODE    893.00 =     680.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    893.00 TO NODE    893.00 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.) =    7.84
  RAINFALL INTENSITY(INCH/HR) =   6.11
  TOTAL STREAM AREA(ACRES) =     1.80
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.89

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      131.80    13.75        4.253         82.85
      2        3.89     7.84        6.113          1.80

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       95.58     7.84       6.113
      2      134.50    13.75       4.253

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     134.50   Tc(MIN.) =   13.75
  TOTAL AREA(ACRES) =       84.7
  LONGEST FLOWPATH FROM NODE    882.00 TO NODE    893.00 =    4359.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    893.00 TO NODE     27.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   755.00  DOWNSTREAM(FEET) =   710.00
  FLOW LENGTH(FEET) =   791.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  24.70
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     134.50
  PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =   14.29
  LONGEST FLOWPATH FROM NODE    882.00 TO NODE     27.00 =    5150.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================
```



```
  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      134.50    14.29        4.150         84.65
  LONGEST FLOWPATH FROM NODE    882.00 TO NODE     27.00 =    5150.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      423.48    17.50        3.641        339.33
  LONGEST FLOWPATH FROM NODE    850.00 TO NODE     27.00 =    8262.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      480.17     14.29        4.150
      2      541.48     17.50        3.641

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     541.48   Tc(MIN.) =   17.50
  TOTAL AREA(ACRES) =      424.0

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     28.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   710.00  DOWNSTREAM(FEET) =   665.00
  FLOW LENGTH(FEET) =  2608.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  58.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.86
  ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     541.48
  PIPE TRAVEL TIME(MIN.) =   1.99    Tc(MIN.) =   19.49
  LONGEST FLOWPATH FROM NODE    850.00 TO NODE     28.00 =   10870.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     28.00 TO NODE     28.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

+------------------------------------------------------------------------+
```

```
| BEGIN 500 SERIES                                                          |
| 1ST TRIBUTARY                                                             |
|                                                                           |
+---------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    500.00 TO NODE    501.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .7000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
  UPSTREAM ELEVATION(FEET) =    991.45
  DOWNSTREAM ELEVATION(FEET) =    990.75
  ELEVATION DIFFERENCE(FEET) =      0.70
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.805
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    65.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.418
  SUBAREA RUNOFF(CFS) =      1.19
  TOTAL AREA(ACRES) =      0.23   TOTAL RUNOFF(CFS) =      1.19

****************************************************************************
  FLOW PROCESS FROM NODE    501.00 TO NODE    502.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  9 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  990.00  DOWNSTREAM ELEVATION(FEET) =  932.50
  STREET LENGTH(FEET) =   616.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.86
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    8.62
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.31
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.88
```



```
  STREET FLOW TRAVEL TIME(MIN.) =   1.63   Tc(MIN.) =    7.43
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.325
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .7000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.700
  SUBAREA AREA(ACRES) =    4.34      SUBAREA RUNOFF(CFS) =   19.21
  TOTAL AREA(ACRES) =        4.6        PEAK FLOW RATE(CFS) =      20.23

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  11.21
  FLOW VELOCITY(FEET/SEC.) =  7.35   DEPTH*VELOCITY(FT*FT/SEC.) =   2.58
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    502.00 =     686.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    502.00 TO NODE    506.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   932.00  DOWNSTREAM(FEET) =   906.00
  FLOW LENGTH(FEET) =   707.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.25
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      20.23
  PIPE TRAVEL TIME(MIN.) =   0.89    Tc(MIN.) =    8.32
  LONGEST FLOWPATH FROM NODE    500.00 TO NODE    506.00 =    1393.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    506.00 TO NODE    506.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.32
  RAINFALL INTENSITY(INCH/HR) =   5.88
  TOTAL STREAM AREA(ACRES) =     4.57
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     20.23

****************************************************************************
  FLOW PROCESS FROM NODE    503.00 TO NODE    504.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .7000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   140.00
  UPSTREAM ELEVATION(FEET) =    983.80
```

```
 DOWNSTREAM ELEVATION(FEET) =    982.10
 ELEVATION DIFFERENCE(FEET) =      1.70
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.574
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    68.21
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.615
 SUBAREA RUNOFF(CFS) =      1.28
 TOTAL AREA(ACRES) =      0.24   TOTAL RUNOFF(CFS) =      1.28

****************************************************************************
 FLOW PROCESS FROM NODE    504.00 TO NODE    505.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  9 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  982.10  DOWNSTREAM ELEVATION(FEET) =  947.90
 STREET LENGTH(FEET) =  1028.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      14.26
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.37
   HALFSTREET FLOOD WIDTH(FEET) =   12.06
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.53
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.67
 STREET FLOW TRAVEL TIME(MIN.) =   3.78   Tc(MIN.) =    9.35
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.453
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .7000
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.700
 SUBAREA AREA(ACRES) =    6.67      SUBAREA RUNOFF(CFS) =   25.46
 TOTAL AREA(ACRES) =        6.9        PEAK FLOW RATE(CFS) =      26.38

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  15.43
 FLOW VELOCITY(FEET/SEC.) =  5.28   DEPTH*VELOCITY(FT*FT/SEC.) =   2.29
 LONGEST FLOWPATH FROM NODE    503.00 TO NODE    505.00 =    1168.00 FEET.

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



```
 FLOW PROCESS FROM NODE    505.00 TO NODE    506.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   947.90  DOWNSTREAM(FEET) =   906.00
 FLOW LENGTH(FEET) =   283.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  23.89
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      26.38
 PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    9.55
 LONGEST FLOWPATH FROM NODE    503.00 TO NODE    506.00 =    1451.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    506.00 TO NODE    506.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    9.55
 RAINFALL INTENSITY(INCH/HR) =   5.38
 TOTAL STREAM AREA(ACRES) =     6.91
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     26.38

****************************************************************************
 FLOW PROCESS FROM NODE    513.00 TO NODE    514.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   170.00
 UPSTREAM ELEVATION(FEET) =    980.00
 DOWNSTREAM ELEVATION(FEET) =    935.00
 ELEVATION DIFFERENCE(FEET) =     45.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.061
 SUBAREA RUNOFF(CFS) =      0.64
 TOTAL AREA(ACRES) =      0.26   TOTAL RUNOFF(CFS) =      0.64

****************************************************************************
 FLOW PROCESS FROM NODE    514.00 TO NODE    506.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
```

```
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    935.00  DOWNSTREAM(FEET) =    906.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   606.00   CHANNEL SLOPE =  0.0479
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.64
  FLOW VELOCITY(FEET/SEC) =   3.28 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.08   Tc(MIN.) =    9.34
  LONGEST FLOWPATH FROM NODE    513.00 TO NODE    506.00 =     776.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    514.00 TO NODE    506.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.457
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    2.96   SUBAREA RUNOFF(CFS) =    5.65
  TOTAL AREA(ACRES) =        3.2   TOTAL RUNOFF(CFS) =       6.15
  TC(MIN.) =    9.34

****************************************************************************
  FLOW PROCESS FROM NODE    506.00 TO NODE    506.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.34
  RAINFALL INTENSITY(INCH/HR) =   5.46
  TOTAL STREAM AREA(ACRES) =     3.22
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.15

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       20.23     8.32        5.880          4.57
      2       26.38     9.55        5.380          6.91
      3        6.15     9.34        5.457          3.22

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       48.69     8.32       5.880
```



```
      2       50.73     9.34       5.457
      3       50.95     9.55       5.380

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      50.95   Tc(MIN.) =    9.55
  TOTAL AREA(ACRES) =       14.7
  LONGEST FLOWPATH FROM NODE    503.00 TO NODE    506.00 =    1451.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    506.00 TO NODE    506.50 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   906.00  DOWNSTREAM(FEET) =   896.50
  FLOW LENGTH(FEET) =   380.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.33
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      50.95
  PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =    9.99
  LONGEST FLOWPATH FROM NODE    503.00 TO NODE    506.50 =    1831.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    506.50 TO NODE    506.50 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.99
  RAINFALL INTENSITY(INCH/HR) =   5.23
  TOTAL STREAM AREA(ACRES) =    14.70
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     50.95

****************************************************************************
  FLOW PROCESS FROM NODE    507.00 TO NODE    508.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .7000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   160.00
  UPSTREAM ELEVATION(FEET) =    930.60
  DOWNSTREAM ELEVATION(FEET) =    925.50
  ELEVATION DIFFERENCE(FEET) =      5.10
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.780
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    95.47
           (Reference: Table 3-1B of Hydrology Manual)
```

```
         THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.168
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      1.72
 TOTAL AREA(ACRES) =      0.30   TOTAL RUNOFF(CFS) =      1.72

****************************************************************************
 FLOW PROCESS FROM NODE    508.00 TO NODE    506.50 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  9 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  925.20  DOWNSTREAM ELEVATION(FEET) =  896.50
 STREET LENGTH(FEET) =   940.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.76
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.38
   HALFSTREET FLOOD WIDTH(FEET) =   12.69
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.49
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.71
 STREET FLOW TRAVEL TIME(MIN.) =   3.49   Tc(MIN.) =    8.27
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.904
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .7000
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.700
 SUBAREA AREA(ACRES) =    2.88      SUBAREA RUNOFF(CFS) =   11.90
 TOTAL AREA(ACRES) =        3.2        PEAK FLOW RATE(CFS) =      13.14

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.44   HALFSTREET FLOOD WIDTH(FEET) =  15.71
 FLOW VELOCITY(FEET/SEC.) =  5.08   DEPTH*VELOCITY(FT*FT/SEC.) =   2.24
 LONGEST FLOWPATH FROM NODE    507.00 TO NODE    506.50 =    1100.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    506.50 TO NODE    506.50 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
```



```
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    8.27
 RAINFALL INTENSITY(INCH/HR) =   5.90
 TOTAL STREAM AREA(ACRES) =     3.18
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     13.14

****************************************************************************
 FLOW PROCESS FROM NODE    510.00 TO NODE    511.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .7000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   160.00
 UPSTREAM ELEVATION(FEET) =    928.50
 DOWNSTREAM ELEVATION(FEET) =    925.50
 ELEVATION DIFFERENCE(FEET) =      3.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.161
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    78.12
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.002
 SUBAREA RUNOFF(CFS) =      1.90
 TOTAL AREA(ACRES) =      0.34   TOTAL RUNOFF(CFS) =      1.90

****************************************************************************
 FLOW PROCESS FROM NODE    511.00 TO NODE    506.50 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  9 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  925.20  DOWNSTREAM ELEVATION(FEET) =  896.50
 STREET LENGTH(FEET) =  1038.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.03
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.36
   HALFSTREET FLOOD WIDTH(FEET) =   11.71
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.05
```

```
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.46
  STREET FLOW TRAVEL TIME(MIN.) =   4.27   Tc(MIN.) =    9.44
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.423
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .7000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.700
  SUBAREA AREA(ACRES) =    2.13      SUBAREA RUNOFF(CFS) =    8.09
  TOTAL AREA(ACRES) =        2.5        PEAK FLOW RATE(CFS) =       9.38

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  13.96
  FLOW VELOCITY(FEET/SEC.) =  4.54   DEPTH*VELOCITY(FT*FT/SEC.) =   1.84
  LONGEST FLOWPATH FROM NODE    510.00 TO NODE    506.50 =    1198.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    506.50 TO NODE    506.50 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.44
  RAINFALL INTENSITY(INCH/HR) =   5.42
  TOTAL STREAM AREA(ACRES) =     2.47
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.38

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       50.95     9.99        5.226         14.70
      2       13.14     8.27        5.904          3.18
      3        9.38     9.44        5.423          2.47

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       66.46     8.27       5.904
      2       70.55     9.44       5.423
      3       71.62     9.99       5.226

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      71.62   Tc(MIN.) =    9.99
  TOTAL AREA(ACRES) =       20.3
  LONGEST FLOWPATH FROM NODE    503.00 TO NODE    506.50 =    1831.00 FEET.

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



```
  FLOW PROCESS FROM NODE    506.50 TO NODE    512.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   896.50  DOWNSTREAM(FEET) =   847.00
  FLOW LENGTH(FEET) =   800.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.50
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      71.62
  PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =   10.61
  LONGEST FLOWPATH FROM NODE    503.00 TO NODE    512.00 =    2631.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    512.00 TO NODE    512.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.61
  RAINFALL INTENSITY(INCH/HR) =   5.03
  TOTAL STREAM AREA(ACRES) =    20.35
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     71.62

****************************************************************************
  FLOW PROCESS FROM NODE    521.00 TO NODE    527.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5200
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    80.00
  UPSTREAM ELEVATION(FEET) =    877.00
  DOWNSTREAM ELEVATION(FEET) =    875.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.880
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.648
  SUBAREA RUNOFF(CFS) =      0.59
  TOTAL AREA(ACRES) =      0.17   TOTAL RUNOFF(CFS) =      0.59

****************************************************************************
  FLOW PROCESS FROM NODE    527.00 TO NODE    512.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   875.00  DOWNSTREAM(FEET) =   847.00
  FLOW LENGTH(FEET) =   444.00   MANNING'S N =  0.013
```

```
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   1.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.97
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.59
 PIPE TRAVEL TIME(MIN.) =   1.24    Tc(MIN.) =    8.12
 LONGEST FLOWPATH FROM NODE    521.00 TO NODE    512.00 =     524.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    527.00 TO NODE    512.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.975
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5200
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5200
 SUBAREA AREA(ACRES) =    2.40   SUBAREA RUNOFF(CFS) =    7.46
 TOTAL AREA(ACRES) =        2.6   TOTAL RUNOFF(CFS) =       7.98
 TC(MIN.) =    8.12

****************************************************************************
 FLOW PROCESS FROM NODE    512.00 TO NODE    512.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    8.12
 RAINFALL INTENSITY(INCH/HR) =   5.97
 TOTAL STREAM AREA(ACRES) =     2.57
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.98

****************************************************************************
 FLOW PROCESS FROM NODE    515.00 TO NODE    516.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .7000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   145.00
 UPSTREAM ELEVATION(FEET) =    895.70
 DOWNSTREAM ELEVATION(FEET) =    894.20
 ELEVATION DIFFERENCE(FEET) =      1.50
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.762
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    65.52
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
```



```
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.453
 SUBAREA RUNOFF(CFS) =      0.89
 TOTAL AREA(ACRES) =      0.17   TOTAL RUNOFF(CFS) =      0.89

****************************************************************************
 FLOW PROCESS FROM NODE    516.00 TO NODE    512.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  9 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  894.20  DOWNSTREAM ELEVATION(FEET) =  847.00
 STREET LENGTH(FEET) =   728.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.94
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.34
   HALFSTREET FLOOD WIDTH(FEET) =   10.93
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.04
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.08
 STREET FLOW TRAVEL TIME(MIN.) =   2.01   Tc(MIN.) =    7.77
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.146
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .7000
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.700
 SUBAREA AREA(ACRES) =    3.26      SUBAREA RUNOFF(CFS) =   14.03
 TOTAL AREA(ACRES) =        3.4        PEAK FLOW RATE(CFS) =      14.76

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  14.17
 FLOW VELOCITY(FEET/SEC.) =  6.94   DEPTH*VELOCITY(FT*FT/SEC.) =   2.84
 LONGEST FLOWPATH FROM NODE    515.00 TO NODE    512.00 =     873.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    512.00 TO NODE    512.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
```

```
 TIME OF CONCENTRATION(MIN.) =    7.77
 RAINFALL INTENSITY(INCH/HR) =   6.15
 TOTAL STREAM AREA(ACRES) =     3.43
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     14.76

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       71.62    10.61        5.027         20.35
     2        7.98     8.12        5.975          2.57
     3       14.76     7.77        6.146          3.43

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  3 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       80.97     7.77       6.146
     2       82.59     8.12       5.975
     3       90.41    10.61       5.027

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      90.41   Tc(MIN.) =   10.61
 TOTAL AREA(ACRES) =       26.3
 LONGEST FLOWPATH FROM NODE    503.00 TO NODE    512.00 =    2631.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    512.00 TO NODE    517.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   847.00  DOWNSTREAM(FEET) =   753.00
 FLOW LENGTH(FEET) =  1019.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  26.28
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      90.41
 PIPE TRAVEL TIME(MIN.) =   0.65    Tc(MIN.) =   11.26
 LONGEST FLOWPATH FROM NODE    503.00 TO NODE    517.00 =    3650.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    512.00 TO NODE    517.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.838
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .7000
 S.C.S. CURVE NUMBER (AMC II) =   0
```



```
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.6530
 SUBAREA AREA(ACRES) =    7.50   SUBAREA RUNOFF(CFS) =   25.40
 TOTAL AREA(ACRES) =       33.8   TOTAL RUNOFF(CFS) =     106.96
 TC(MIN.) =   11.26

****************************************************************************
 FLOW PROCESS FROM NODE    517.00 TO NODE    518.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   753.00  DOWNSTREAM(FEET) =   708.00
 FLOW LENGTH(FEET) =   772.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  23.56
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     106.96
 PIPE TRAVEL TIME(MIN.) =   0.55    Tc(MIN.) =   11.81
 LONGEST FLOWPATH FROM NODE    503.00 TO NODE    518.00 =    4422.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    517.00 TO NODE    518.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.693
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .7000
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.6574
 SUBAREA AREA(ACRES) =    3.49   SUBAREA RUNOFF(CFS) =   11.46
 TOTAL AREA(ACRES) =       37.3   TOTAL RUNOFF(CFS) =     115.20
 TC(MIN.) =   11.81

****************************************************************************
 FLOW PROCESS FROM NODE    518.00 TO NODE    519.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   708.00  DOWNSTREAM(FEET) =   704.00
 FLOW LENGTH(FEET) =   116.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  28.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  19.44
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     115.20
 PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   11.90
 LONGEST FLOWPATH FROM NODE    503.00 TO NODE    519.00 =    4538.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    519.00 TO NODE    519.00 IS CODE =  10
```

```
------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
========================================================================

+----------------------------------------------------------------------+
| 2ND TRIBUTARY                                                        |
|                                                                      |
|                                                                      |
+----------------------------------------------------------------------+

************************************************************************
  FLOW PROCESS FROM NODE    530.00 TO NODE    531.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   120.00
  UPSTREAM ELEVATION(FEET) =    882.00
  DOWNSTREAM ELEVATION(FEET) =    881.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.408
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    60.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.338
  SUBAREA RUNOFF(CFS) =      0.84
  TOTAL AREA(ACRES) =      0.22   TOTAL RUNOFF(CFS) =      0.84

************************************************************************
  FLOW PROCESS FROM NODE    531.00 TO NODE    532.00 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  9 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) =  881.00  DOWNSTREAM ELEVATION(FEET) =  862.00
  STREET LENGTH(FEET) =   473.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.98
```



```
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =    9.04
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.27
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.31
  STREET FLOW TRAVEL TIME(MIN.) =   1.85   Tc(MIN.) =    9.25
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.491
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.600
  SUBAREA AREA(ACRES) =    4.32      SUBAREA RUNOFF(CFS) =   14.23
  TOTAL AREA(ACRES) =        4.5        PEAK FLOW RATE(CFS) =      14.96

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  11.85
  FLOW VELOCITY(FEET/SEC.) =  4.91   DEPTH*VELOCITY(FT*FT/SEC.) =   1.78
  LONGEST FLOWPATH FROM NODE    530.00 TO NODE    532.00 =     593.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    532.00 TO NODE    533.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   862.00  DOWNSTREAM(FEET) =   858.00
  FLOW LENGTH(FEET) =    43.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.48
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.96
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    9.29
  LONGEST FLOWPATH FROM NODE    530.00 TO NODE    533.00 =     636.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    533.00 TO NODE    533.00 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) =   5.48
  TOTAL STREAM AREA(ACRES) =     4.54
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     14.96

************************************************************************
  FLOW PROCESS FROM NODE    539.00 TO NODE    540.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
==========================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   130.00
  UPSTREAM ELEVATION(FEET) =    915.00
  DOWNSTREAM ELEVATION(FEET) =    912.00
  ELEVATION DIFFERENCE(FEET) =      3.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    9.397
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    84.62
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.437
  SUBAREA RUNOFF(CFS) =      0.36
  TOTAL AREA(ACRES) =      0.19   TOTAL RUNOFF(CFS) =      0.36

**************************************************************************
  FLOW PROCESS FROM NODE    540.00 TO NODE    541.00 IS CODE =  52
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    912.00  DOWNSTREAM(FEET) =    875.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   677.00   CHANNEL SLOPE =  0.0547
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.36
  FLOW VELOCITY(FEET/SEC) =   3.51 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.22   Tc(MIN.) =   12.62
  LONGEST FLOWPATH FROM NODE    539.00 TO NODE    541.00 =     807.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    540.00 TO NODE    541.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.496
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    4.66   SUBAREA RUNOFF(CFS) =    7.33
  TOTAL AREA(ACRES) =        4.8   TOTAL RUNOFF(CFS) =       7.63
  TC(MIN.) =   12.62

**************************************************************************
  FLOW PROCESS FROM NODE    541.00 TO NODE    533.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
```



```
  ELEVATION DATA: UPSTREAM(FEET) =   875.00  DOWNSTREAM(FEET) =   858.00
  FLOW LENGTH(FEET) =   256.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.92
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.63
  PIPE TRAVEL TIME(MIN.) =   0.33    Tc(MIN.) =   12.95
  LONGEST FLOWPATH FROM NODE    539.00 TO NODE    533.00 =    1063.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    533.00 TO NODE    533.00 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.) =   12.95
  RAINFALL INTENSITY(INCH/HR) =   4.42
  TOTAL STREAM AREA(ACRES) =     4.85
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.63

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       14.96     9.29        5.475          4.54
      2        7.63    12.95        4.422          4.85

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       20.44     9.29       5.475
      2       19.71    12.95       4.422

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      20.44   Tc(MIN.) =    9.29
  TOTAL AREA(ACRES) =        9.4
  LONGEST FLOWPATH FROM NODE    539.00 TO NODE    533.00 =    1063.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    533.00 TO NODE    535.00 IS CODE =  31
--------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   858.00  DOWNSTREAM(FEET) =   848.00
  FLOW LENGTH(FEET) =   251.00   MANNING'S N =  0.013
```

```
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.70
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      20.44
 PIPE TRAVEL TIME(MIN.) =   0.31    Tc(MIN.) =    9.60
 LONGEST FLOWPATH FROM NODE    539.00 TO NODE    535.00 =    1314.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    535.00 TO NODE    535.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    9.60
 RAINFALL INTENSITY(INCH/HR) =   5.36
 TOTAL STREAM AREA(ACRES) =     9.39
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     20.44

****************************************************************************
 FLOW PROCESS FROM NODE    509.00 TO NODE    513.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .7000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   143.00
 UPSTREAM ELEVATION(FEET) =    977.00
 DOWNSTREAM ELEVATION(FEET) =    963.00
 ELEVATION DIFFERENCE(FEET) =     14.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.366
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.168
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.86
 TOTAL AREA(ACRES) =      0.15   TOTAL RUNOFF(CFS) =      0.86

****************************************************************************
 FLOW PROCESS FROM NODE    513.00 TO NODE    535.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  9 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  963.00  DOWNSTREAM ELEVATION(FEET) =  848.00
 STREET LENGTH(FEET) =  1347.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00
```



```
 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      14.68
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.39
   HALFSTREET FLOOD WIDTH(FEET) =   13.32
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.75
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    3.04
 STREET FLOW TRAVEL TIME(MIN.) =   2.90   Tc(MIN.) =    6.26
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.064
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .7000
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.700
 SUBAREA AREA(ACRES) =    5.55      SUBAREA RUNOFF(CFS) =   27.44
 TOTAL AREA(ACRES) =        5.7        PEAK FLOW RATE(CFS) =      28.19

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.47   HALFSTREET FLOOD WIDTH(FEET) =  17.33
 FLOW VELOCITY(FEET/SEC.) =  9.03   DEPTH*VELOCITY(FT*FT/SEC.) =   4.27
 LONGEST FLOWPATH FROM NODE    509.00 TO NODE    535.00 =    1490.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    535.00 TO NODE    535.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    6.26
 RAINFALL INTENSITY(INCH/HR) =   7.06
 TOTAL STREAM AREA(ACRES) =     5.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     28.19

****************************************************************************
 FLOW PROCESS FROM NODE    537.00 TO NODE    538.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   112.00
 UPSTREAM ELEVATION(FEET) =    909.00
```

```
 DOWNSTREAM ELEVATION(FEET) =    904.50
 ELEVATION DIFFERENCE(FEET) =      4.50
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.592
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    97.54
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.599
 SUBAREA RUNOFF(CFS) =      0.41
 TOTAL AREA(ACRES) =      0.09   TOTAL RUNOFF(CFS) =      0.41

****************************************************************************
 FLOW PROCESS FROM NODE    538.00 TO NODE    535.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  9 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  904.50  DOWNSTREAM ELEVATION(FEET) =  848.00
 STREET LENGTH(FEET) =   682.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.61
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.29
   HALFSTREET FLOOD WIDTH(FEET) =    8.21
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.82
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.69
 STREET FLOW TRAVEL TIME(MIN.) =   1.95   Tc(MIN.) =    7.54
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.264
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.600
 SUBAREA AREA(ACRES) =    2.22      SUBAREA RUNOFF(CFS) =    8.34
 TOTAL AREA(ACRES) =        2.3        PEAK FLOW RATE(CFS) =       8.68

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.79
 FLOW VELOCITY(FEET/SEC.) =  6.77   DEPTH*VELOCITY(FT*FT/SEC.) =   2.32
 LONGEST FLOWPATH FROM NODE    537.00 TO NODE    535.00 =     794.00 FEET.

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



```
 FLOW PROCESS FROM NODE    535.00 TO NODE    535.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION(MIN.) =    7.54
 RAINFALL INTENSITY(INCH/HR) =   6.26
 TOTAL STREAM AREA(ACRES) =     2.31
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.68

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
    1       20.44     9.60        5.362          9.39
    2       28.19     6.26        7.064          5.70
    3        8.68     7.54        6.264          2.31

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  3 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
    1       50.91     6.26       7.064
    2       51.17     7.54       6.264
    3       49.27     9.60       5.362

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      51.17   Tc(MIN.) =    7.54
 TOTAL AREA(ACRES) =       17.4
 LONGEST FLOWPATH FROM NODE    509.00 TO NODE    535.00 =    1490.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    535.00 TO NODE    536.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   848.00  DOWNSTREAM(FEET) =   724.80
 FLOW LENGTH(FEET) =  1019.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  25.41
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      51.17
 PIPE TRAVEL TIME(MIN.) =   0.67    Tc(MIN.) =    8.21
 LONGEST FLOWPATH FROM NODE    509.00 TO NODE    536.00 =    2509.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    535.00 TO NODE    536.00 IS CODE =  81
```

```
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.931
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5731
  SUBAREA AREA(ACRES) =    6.45   SUBAREA RUNOFF(CFS) =   22.95
  TOTAL AREA(ACRES) =       23.8   TOTAL RUNOFF(CFS) =      81.06
  TC(MIN.) =    8.21

************************************************************************
  FLOW PROCESS FROM NODE    536.00 TO NODE    536.00 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.) =    8.21
  RAINFALL INTENSITY(INCH/HR) =   5.93
  TOTAL STREAM AREA(ACRES) =    23.85
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     81.06

************************************************************************
  FLOW PROCESS FROM NODE    542.00 TO NODE    543.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    870.00
  DOWNSTREAM ELEVATION(FEET) =    840.00
  ELEVATION DIFFERENCE(FEET) =     30.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.061
  SUBAREA RUNOFF(CFS) =      0.44
  TOTAL AREA(ACRES) =      0.18   TOTAL RUNOFF(CFS) =      0.44

************************************************************************
  FLOW PROCESS FROM NODE    543.00 TO NODE    536.00 IS CODE =  52
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    840.00  DOWNSTREAM(FEET) =    722.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1067.00   CHANNEL SLOPE =  0.1106
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
```



```
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.44
  FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.75   Tc(MIN.) =   10.02
  LONGEST FLOWPATH FROM NODE    542.00 TO NODE    536.00 =    1167.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    543.00 TO NODE    536.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.218
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    7.40   SUBAREA RUNOFF(CFS) =   13.51
  TOTAL AREA(ACRES) =        7.6   TOTAL RUNOFF(CFS) =      13.84
  TC(MIN.) =   10.02

************************************************************************
  FLOW PROCESS FROM NODE    536.00 TO NODE    536.00 IS CODE =   1
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.02
  RAINFALL INTENSITY(INCH/HR) =   5.22
  TOTAL STREAM AREA(ACRES) =     7.58
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     13.84

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       81.06     8.21        5.931         23.85
      2       13.84    10.02        5.218          7.58

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF       Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       92.41     8.21        5.931
      2       85.16    10.02        5.218

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      92.41   Tc(MIN.) =    8.21
  TOTAL AREA(ACRES) =       31.4
```

```
 LONGEST FLOWPATH FROM NODE    509.00 TO NODE    536.00 =    2509.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    536.00 TO NODE    519.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   724.80  DOWNSTREAM(FEET) =   704.00
 FLOW LENGTH(FEET) =   312.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  23.78
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      92.41
 PIPE TRAVEL TIME(MIN.) =   0.22    Tc(MIN.) =    8.43
 LONGEST FLOWPATH FROM NODE    509.00 TO NODE    519.00 =    2821.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    519.00 TO NODE    519.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1       92.41     8.43       5.831       31.43
 LONGEST FLOWPATH FROM NODE    509.00 TO NODE    519.00 =    2821.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1      115.20    11.90       4.668       37.34
 LONGEST FLOWPATH FROM NODE    503.00 TO NODE    519.00 =    4538.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc      INTENSITY
 NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1     174.00       8.43        5.831
     2     189.17      11.90        4.668

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     189.17   Tc(MIN.) =   11.90
 TOTAL AREA(ACRES) =       68.8

****************************************************************************
 FLOW PROCESS FROM NODE    519.00 TO NODE    519.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================
```



```
****************************************************************************
 FLOW PROCESS FROM NODE    519.00 TO NODE    519.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

+------------------------------------------------------------------------+
| 3RD TRIBUTARY                                                          |
|                                                                        |
|                                                                        |
+------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    550.00 TO NODE    551.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .7000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   145.00
 UPSTREAM ELEVATION(FEET) =    983.60
 DOWNSTREAM ELEVATION(FEET) =    982.10
 ELEVATION DIFFERENCE(FEET) =      1.50
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.762
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    65.52
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.453
 SUBAREA RUNOFF(CFS) =      1.20
 TOTAL AREA(ACRES) =      0.23   TOTAL RUNOFF(CFS) =      1.20

****************************************************************************
 FLOW PROCESS FROM NODE    551.00 TO NODE    552.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  9 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  982.10  DOWNSTREAM ELEVATION(FEET) =  974.70
 STREET LENGTH(FEET) =   356.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

```
   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.42
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.34
   HALFSTREET FLOOD WIDTH(FEET) =   10.86
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.41
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.17
  STREET FLOW TRAVEL TIME(MIN.) =   1.74   Tc(MIN.) =    7.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.286
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .7000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.700
  SUBAREA AREA(ACRES) =    1.46      SUBAREA RUNOFF(CFS) =    6.42
  TOTAL AREA(ACRES) =        1.7        PEAK FLOW RATE(CFS) =       7.44

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  13.46
  FLOW VELOCITY(FEET/SEC.) =  3.85   DEPTH*VELOCITY(FT*FT/SEC.) =   1.52
  LONGEST FLOWPATH FROM NODE    550.00 TO NODE    552.00 =     501.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    552.00 TO NODE    553.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   974.70  DOWNSTREAM(FEET) =   883.00
  FLOW LENGTH(FEET) =   982.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.51
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.44
  PIPE TRAVEL TIME(MIN.) =   1.13    Tc(MIN.) =    8.63
  LONGEST FLOWPATH FROM NODE    550.00 TO NODE    553.00 =    1483.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    552.00 TO NODE    553.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.743
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .7000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.7000
  SUBAREA AREA(ACRES) =    4.00   SUBAREA RUNOFF(CFS) =   16.08
  TOTAL AREA(ACRES) =        5.7   TOTAL RUNOFF(CFS) =      22.87
  TC(MIN.) =    8.63
```



```
****************************************************************************
  FLOW PROCESS FROM NODE    553.00 TO NODE    554.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   883.00  DOWNSTREAM(FEET) =   779.00
  FLOW LENGTH(FEET) =   716.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  22.96
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      22.87
  PIPE TRAVEL TIME(MIN.) =   0.52    Tc(MIN.) =    9.15
  LONGEST FLOWPATH FROM NODE    550.00 TO NODE    554.00 =    2199.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    553.00 TO NODE    554.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.530
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6572
  SUBAREA AREA(ACRES) =    4.25   SUBAREA RUNOFF(CFS) =   14.10
  TOTAL AREA(ACRES) =        9.9   TOTAL RUNOFF(CFS) =      36.13
  TC(MIN.) =    9.15

****************************************************************************
  FLOW PROCESS FROM NODE    554.00 TO NODE    555.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   779.00  DOWNSTREAM(FEET) =   706.00
  FLOW LENGTH(FEET) =   828.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.12
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      36.13
  PIPE TRAVEL TIME(MIN.) =   0.65    Tc(MIN.) =    9.81
  LONGEST FLOWPATH FROM NODE    550.00 TO NODE    555.00 =    3027.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    555.00 TO NODE    555.00 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.) =    9.81
 RAINFALL INTENSITY(INCH/HR) =   5.29
 TOTAL STREAM AREA(ACRES) =     9.94
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     36.13

****************************************************************************
 FLOW PROCESS FROM NODE    514.00 TO NODE    521.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   200.00
 UPSTREAM ELEVATION(FEET) =    850.00
 DOWNSTREAM ELEVATION(FEET) =    815.00
 ELEVATION DIFFERENCE(FEET) =     35.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.061
 SUBAREA RUNOFF(CFS) =      0.74
 TOTAL AREA(ACRES) =      0.30   TOTAL RUNOFF(CFS) =      0.74

****************************************************************************
 FLOW PROCESS FROM NODE    521.00 TO NODE    555.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    815.00  DOWNSTREAM(FEET) =    706.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1113.00   CHANNEL SLOPE =  0.0979
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.74
 FLOW VELOCITY(FEET/SEC) =   4.69 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   3.95   Tc(MIN.) =   10.22
 LONGEST FLOWPATH FROM NODE    514.00 TO NODE    555.00 =    1313.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    521.00 TO NODE    555.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.151
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
```



```
 SUBAREA AREA(ACRES) =    1.92   SUBAREA RUNOFF(CFS) =    3.46
 TOTAL AREA(ACRES) =        2.2   TOTAL RUNOFF(CFS) =       4.00
 TC(MIN.) =   10.22

****************************************************************************
 FLOW PROCESS FROM NODE    555.00 TO NODE    555.00 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.) =   10.22
 RAINFALL INTENSITY(INCH/HR) =   5.15
 TOTAL STREAM AREA(ACRES) =     2.22
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.00

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       36.13     9.81        5.290          9.94
     2        4.00    10.22        5.151          2.22

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       39.97     9.81       5.290
     2       39.18    10.22       5.151

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      39.97   Tc(MIN.) =    9.81
 TOTAL AREA(ACRES) =       12.2
 LONGEST FLOWPATH FROM NODE    550.00 TO NODE    555.00 =    3027.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    555.00 TO NODE    556.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   706.00  DOWNSTREAM(FEET) =   704.90
 FLOW LENGTH(FEET) =    89.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  22.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.25
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      39.97
 PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =    9.95
 LONGEST FLOWPATH FROM NODE    550.00 TO NODE    556.00 =    3116.00 FEET.
```

```
**************************************************************************
  FLOW PROCESS FROM NODE    556.00 TO NODE    556.00 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.) =    9.95
  RAINFALL INTENSITY(INCH/HR) =   5.24
  TOTAL STREAM AREA(ACRES) =    12.16
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     39.97

**************************************************************************
  FLOW PROCESS FROM NODE    557.00 TO NODE    558.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6800
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    775.50
  DOWNSTREAM ELEVATION(FEET) =    773.00
  ELEVATION DIFFERENCE(FEET) =      2.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.211
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    87.50
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.953
  SUBAREA RUNOFF(CFS) =      0.87
  TOTAL AREA(ACRES) =      0.16   TOTAL RUNOFF(CFS) =      0.87

**************************************************************************
  FLOW PROCESS FROM NODE    558.00 TO NODE    556.00 IS CODE =  62
--------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  9 USED)<<<<<
==========================================================================
  UPSTREAM ELEVATION(FEET) =  773.00  DOWNSTREAM ELEVATION(FEET) =  704.90
  STREET LENGTH(FEET) =   894.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
```



```
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.54
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    8.85
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.84
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.77
  STREET FLOW TRAVEL TIME(MIN.) =   2.55   Tc(MIN.) =    7.76
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.151
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.680
  SUBAREA AREA(ACRES) =    4.58      SUBAREA RUNOFF(CFS) =   19.16
  TOTAL AREA(ACRES) =        4.7        PEAK FLOW RATE(CFS) =      19.83

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  11.64
  FLOW VELOCITY(FEET/SEC.) =  6.73   DEPTH*VELOCITY(FT*FT/SEC.) =   2.42
  LONGEST FLOWPATH FROM NODE    557.00 TO NODE    556.00 =     994.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    556.00 TO NODE    556.00 IS CODE =   1
--------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.76
  RAINFALL INTENSITY(INCH/HR) =   6.15
  TOTAL STREAM AREA(ACRES) =     4.74
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     19.83

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       39.97     9.95        5.240         12.16
      2       19.83     7.76        6.151          4.74

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       53.88     7.76       6.151
      2       56.86     9.95       5.240

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
```

```
 PEAK FLOW RATE(CFS) =      56.86   Tc(MIN.) =    9.95
 TOTAL AREA(ACRES) =       16.9
 LONGEST FLOWPATH FROM NODE    550.00 TO NODE    556.00 =    3116.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    556.00 TO NODE    519.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   704.90  DOWNSTREAM(FEET) =   704.00
 FLOW LENGTH(FEET) =    48.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.22
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      56.86
 PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   10.01
 LONGEST FLOWPATH FROM NODE    550.00 TO NODE    519.00 =    3164.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    519.00 TO NODE    519.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1       56.86    10.01       5.220       16.90
 LONGEST FLOWPATH FROM NODE    550.00 TO NODE    519.00 =    3164.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1      189.17    11.90       4.668       68.77
 LONGEST FLOWPATH FROM NODE    503.00 TO NODE    519.00 =    4538.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc      INTENSITY
 NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1     215.94      10.01        5.220
     2     240.02      11.90        4.668

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     240.02   Tc(MIN.) =   11.90
 TOTAL AREA(ACRES) =       85.7

****************************************************************************
 FLOW PROCESS FROM NODE    519.00 TO NODE    519.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 2 <<<<<
```



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

****************************************************************************
 FLOW PROCESS FROM NODE    519.00 TO NODE    498.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   704.00  DOWNSTREAM(FEET) =   702.00
 FLOW LENGTH(FEET) =   266.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  63.0 INCH PIPE IS  49.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.19
 ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     240.02
 PIPE TRAVEL TIME(MIN.) =   0.34    Tc(MIN.) =   12.24
 LONGEST FLOWPATH FROM NODE    503.00 TO NODE    498.00 =    4804.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    498.00 TO NODE    498.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

+--------------------------------------------------------------------------+
| BEGIN 400 SERIES FROM SOUTH                                              |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    490.00 TO NODE    491.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    713.30
 DOWNSTREAM ELEVATION(FEET) =    711.50
 ELEVATION DIFFERENCE(FEET) =      1.80
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.492
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    77.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.901
 SUBAREA RUNOFF(CFS) =      0.46
 TOTAL AREA(ACRES) =      0.11   TOTAL RUNOFF(CFS) =      0.46

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

```
 FLOW PROCESS FROM NODE    491.00 TO NODE    492.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  9 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  711.50  DOWNSTREAM ELEVATION(FEET) =  705.00
 STREET LENGTH(FEET) =   417.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.38
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.30
   HALFSTREET FLOOD WIDTH(FEET) =    8.56
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.57
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.77
 STREET FLOW TRAVEL TIME(MIN.) =   2.70   Tc(MIN.) =    9.19
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.514
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.600
 SUBAREA AREA(ACRES) =    2.35      SUBAREA RUNOFF(CFS) =    7.77
 TOTAL AREA(ACRES) =        2.5        PEAK FLOW RATE(CFS) =       8.14

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  11.14
 FLOW VELOCITY(FEET/SEC.) =  2.99   DEPTH*VELOCITY(FT*FT/SEC.) =   1.04
 LONGEST FLOWPATH FROM NODE    490.00 TO NODE    492.00 =     517.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    492.00 TO NODE    492.00 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.) =    9.19
 RAINFALL INTENSITY(INCH/HR) =   5.51
 TOTAL STREAM AREA(ACRES) =     2.46
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.14

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



```
 FLOW PROCESS FROM NODE    483.00 TO NODE    483.10 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
 UPSTREAM ELEVATION(FEET) =    760.00
 DOWNSTREAM ELEVATION(FEET) =    730.00
 ELEVATION DIFFERENCE(FEET) =     30.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.243
 WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.921
 SUBAREA RUNOFF(CFS) =      0.25
 TOTAL AREA(ACRES) =      0.09   TOTAL RUNOFF(CFS) =      0.25

****************************************************************************
 FLOW PROCESS FROM NODE    483.10 TO NODE    484.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    730.00  DOWNSTREAM(FEET) =    710.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   600.00   CHANNEL SLOPE =  0.0333
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.25
 FLOW VELOCITY(FEET/SEC) =   2.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   3.65   Tc(MIN.) =    8.89
 LONGEST FLOWPATH FROM NODE    483.00 TO NODE    484.00 =     670.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    483.10 TO NODE    484.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.633
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =    2.07   SUBAREA RUNOFF(CFS) =    4.08
 TOTAL AREA(ACRES) =        2.2   TOTAL RUNOFF(CFS) =       4.26
 TC(MIN.) =    8.89

****************************************************************************
 FLOW PROCESS FROM NODE    484.00 TO NODE    492.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
```

```
 ELEVATION DATA: UPSTREAM(FEET) =   710.00  DOWNSTREAM(FEET) =   705.00
 FLOW LENGTH(FEET) =   133.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.95
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       4.26
 PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =    9.14
 LONGEST FLOWPATH FROM NODE    483.00 TO NODE    492.00 =     803.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    492.00 TO NODE    492.00 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.) =    9.14
 RAINFALL INTENSITY(INCH/HR) =   5.53
 TOTAL STREAM AREA(ACRES) =     2.16
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.26

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        8.14     9.19        5.514          2.46
     2        4.26     9.14        5.534          2.16

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       12.35     9.14       5.534
     2       12.38     9.19       5.514

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      12.38   Tc(MIN.) =    9.19
 TOTAL AREA(ACRES) =        4.6
 LONGEST FLOWPATH FROM NODE    483.00 TO NODE    492.00 =     803.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    492.00 TO NODE    496.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   706.00  DOWNSTREAM(FEET) =   696.00
 FLOW LENGTH(FEET) =   664.00   MANNING'S N =  0.013
```



```
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.11
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      12.38
 PIPE TRAVEL TIME(MIN.) =   1.37    Tc(MIN.) =   10.56
 LONGEST FLOWPATH FROM NODE    483.00 TO NODE    496.00 =    1467.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    496.00 TO NODE    496.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   10.56
 RAINFALL INTENSITY(INCH/HR) =   5.04
 TOTAL STREAM AREA(ACRES) =     4.62
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     12.38

****************************************************************************
 FLOW PROCESS FROM NODE    480.00 TO NODE    481.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   116.00
 UPSTREAM ELEVATION(FEET) =    705.00
 DOWNSTREAM ELEVATION(FEET) =    704.00
 ELEVATION DIFFERENCE(FEET) =      1.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.377
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    60.86
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.355
 SUBAREA RUNOFF(CFS) =      0.31
 TOTAL AREA(ACRES) =      0.08   TOTAL RUNOFF(CFS) =      0.31

****************************************************************************
 FLOW PROCESS FROM NODE    481.00 TO NODE    494.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  9 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  704.00  DOWNSTREAM ELEVATION(FEET) =  695.00
 STREET LENGTH(FEET) =   523.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
```

```
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.09
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    8.21
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.64
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.77
  STREET FLOW TRAVEL TIME(MIN.) =   3.30   Tc(MIN.) =   10.67
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.008
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.600
  SUBAREA AREA(ACRES) =    1.18      SUBAREA RUNOFF(CFS) =    3.55
  TOTAL AREA(ACRES) =        1.3        PEAK FLOW RATE(CFS) =       3.79

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.58
  FLOW VELOCITY(FEET/SEC.) =  3.06   DEPTH*VELOCITY(FT*FT/SEC.) =   1.03
  LONGEST FLOWPATH FROM NODE    480.00 TO NODE    494.00 =     639.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    494.00 TO NODE    496.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   695.50  DOWNSTREAM(FEET) =   695.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.82
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.79
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   10.79
  LONGEST FLOWPATH FROM NODE    480.00 TO NODE    496.00 =     679.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    496.00 TO NODE    496.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
```



```
  TIME OF CONCENTRATION(MIN.) =   10.79
  RAINFALL INTENSITY(INCH/HR) =   4.97
  TOTAL STREAM AREA(ACRES) =     1.26
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.79

****************************************************************************
  FLOW PROCESS FROM NODE    477.00 TO NODE    478.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   111.00
  UPSTREAM ELEVATION(FEET) =    758.00
  DOWNSTREAM ELEVATION(FEET) =    756.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.491
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    77.03
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.902
  SUBAREA RUNOFF(CFS) =      1.37
  TOTAL AREA(ACRES) =      0.33   TOTAL RUNOFF(CFS) =      1.37

****************************************************************************
  FLOW PROCESS FROM NODE    478.00 TO NODE    495.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  9 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  756.00  DOWNSTREAM ELEVATION(FEET) =  695.50
  STREET LENGTH(FEET) =  1085.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.16
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.37
    HALFSTREET FLOOD WIDTH(FEET) =   11.99
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.89
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.16
```

```
 STREET FLOW TRAVEL TIME(MIN.) =   3.07   Tc(MIN.) =    9.56
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.376
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6000
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.600
 SUBAREA AREA(ACRES) =    4.79      SUBAREA RUNOFF(CFS) =   15.45
 TOTAL AREA(ACRES) =        5.1        PEAK FLOW RATE(CFS) =      16.52

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  15.22
 FLOW VELOCITY(FEET/SEC.) =  6.78   DEPTH*VELOCITY(FT*FT/SEC.) =   2.92
 LONGEST FLOWPATH FROM NODE    477.00 TO NODE    495.00 =    1196.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    495.00 TO NODE    496.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   695.50  DOWNSTREAM(FEET) =   695.00
 FLOW LENGTH(FEET) =    14.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  12.30
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      16.52
 PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    9.58
 LONGEST FLOWPATH FROM NODE    477.00 TO NODE    496.00 =    1210.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    496.00 TO NODE    496.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION(MIN.) =    9.58
 RAINFALL INTENSITY(INCH/HR) =   5.37
 TOTAL STREAM AREA(ACRES) =     5.12
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     16.52

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       12.38    10.56        5.043         4.62
     2        3.79    10.79        4.973         1.26
     3       16.52     9.58        5.369         5.12

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  3 STREAMS.
```



```
 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       31.51     9.58       5.369
     2       31.60    10.56       5.043
     3       31.30    10.79       4.973

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      31.60   Tc(MIN.) =   10.56
 TOTAL AREA(ACRES) =       11.0
 LONGEST FLOWPATH FROM NODE    483.00 TO NODE    496.00 =    1467.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    496.00 TO NODE    498.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   695.00  DOWNSTREAM(FEET) =   692.00
 FLOW LENGTH(FEET) =   329.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  20.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   8.69
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      31.60
 PIPE TRAVEL TIME(MIN.) =   0.63    Tc(MIN.) =   11.19
 LONGEST FLOWPATH FROM NODE    483.00 TO NODE    498.00 =    1796.00 FEET.

+----------------------------------------------------------------------------+
| END 400 SERIES                                                             |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    498.00 TO NODE    498.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1       31.60    11.19       4.858       11.00
 LONGEST FLOWPATH FROM NODE    483.00 TO NODE    498.00 =    1796.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1      240.02    12.24       4.584       85.67
 LONGEST FLOWPATH FROM NODE    503.00 TO NODE    498.00 =    4804.00 FEET.
```

```
 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc      INTENSITY
 NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1     251.02      11.19        4.858
     2     269.84      12.24        4.584

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     269.84   Tc(MIN.) =   12.24
 TOTAL AREA(ACRES) =       96.7

****************************************************************************
 FLOW PROCESS FROM NODE    498.00 TO NODE    498.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    498.00 TO NODE    685.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   692.00  DOWNSTREAM(FEET) =   689.00
 FLOW LENGTH(FEET) =    79.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  38.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  24.75
 ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     269.84
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   12.29
 LONGEST FLOWPATH FROM NODE    503.00 TO NODE    685.00 =    4883.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    685.00 TO NODE    685.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    680.00 TO NODE    681.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .7500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   124.00
 UPSTREAM ELEVATION(FEET) =    731.00
 DOWNSTREAM ELEVATION(FEET) =    729.00
 ELEVATION DIFFERENCE(FEET) =      2.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.627
```



```
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    74.19
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.168
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      1.16
 TOTAL AREA(ACRES) =      0.19   TOTAL RUNOFF(CFS) =      1.16

****************************************************************************
 FLOW PROCESS FROM NODE    681.00 TO NODE    684.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  8 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  729.00  DOWNSTREAM ELEVATION(FEET) =  718.00
 STREET LENGTH(FEET) =   705.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.78
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.29
   HALFSTREET FLOOD WIDTH(FEET) =    7.97
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.51
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.72
 STREET FLOW TRAVEL TIME(MIN.) =   4.69   Tc(MIN.) =    9.32
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.467
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .7500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.750
 SUBAREA AREA(ACRES) =    1.25      SUBAREA RUNOFF(CFS) =    5.13
 TOTAL AREA(ACRES) =        1.4        PEAK FLOW RATE(CFS) =       5.90

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =   9.77
 FLOW VELOCITY(FEET/SEC.) =  2.75   DEPTH*VELOCITY(FT*FT/SEC.) =   0.89
 LONGEST FLOWPATH FROM NODE    680.00 TO NODE    684.00 =     829.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    684.00 TO NODE    684.00 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.) =    9.32
  RAINFALL INTENSITY(INCH/HR) =   5.47
  TOTAL STREAM AREA(ACRES) =     1.44
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.90

****************************************************************************
  FLOW PROCESS FROM NODE    678.00 TO NODE    679.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   136.00
  UPSTREAM ELEVATION(FEET) =    735.00
  DOWNSTREAM ELEVATION(FEET) =    734.60
  ELEVATION DIFFERENCE(FEET) =      0.40
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =   12.027
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    50.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.637
  SUBAREA RUNOFF(CFS) =      0.19
  TOTAL AREA(ACRES) =      0.12   TOTAL RUNOFF(CFS) =      0.19

****************************************************************************
  FLOW PROCESS FROM NODE    679.00 TO NODE    682.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    734.60  DOWNSTREAM(FEET) =    720.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   814.00   CHANNEL SLOPE =  0.0179
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.19
  FLOW VELOCITY(FEET/SEC) =   2.01 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.75   Tc(MIN.) =   18.78
  LONGEST FLOWPATH FROM NODE    678.00 TO NODE    682.00 =     950.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    679.00 TO NODE    682.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.479
  *USER SPECIFIED(SUBAREA):
```



```
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    8.81   SUBAREA RUNOFF(CFS) =   10.73
  TOTAL AREA(ACRES) =        8.9   TOTAL RUNOFF(CFS) =      10.87
  TC(MIN.) =   18.78

****************************************************************************
  FLOW PROCESS FROM NODE    682.00 TO NODE    684.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   720.00  DOWNSTREAM(FEET) =   718.00
  FLOW LENGTH(FEET) =   656.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  17.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.38
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.87
  PIPE TRAVEL TIME(MIN.) =   2.50    Tc(MIN.) =   21.28
  LONGEST FLOWPATH FROM NODE    678.00 TO NODE    684.00 =    1606.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    684.00 TO NODE    684.00 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.) =   21.28
  RAINFALL INTENSITY(INCH/HR) =   3.21
  TOTAL STREAM AREA(ACRES) =     8.93
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.87

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        5.90      9.32        5.467          1.44
      2       10.87    21.28         3.210          8.93

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       10.67     9.32       5.467
      2       14.34    21.28       3.210

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
```

```
 PEAK FLOW RATE(CFS) =      14.34   Tc(MIN.) =   21.28
 TOTAL AREA(ACRES) =       10.4
 LONGEST FLOWPATH FROM NODE    678.00 TO NODE    684.00 =    1606.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    684.00 TO NODE    685.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   718.00  DOWNSTREAM(FEET) =   689.00
 FLOW LENGTH(FEET) =  1000.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.01
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      14.34
 PIPE TRAVEL TIME(MIN.) =   1.51    Tc(MIN.) =   22.79
 LONGEST FLOWPATH FROM NODE    678.00 TO NODE    685.00 =    2606.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    685.00 TO NODE    685.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1       14.34    22.79       3.070       10.37
 LONGEST FLOWPATH FROM NODE    678.00 TO NODE    685.00 =    2606.00 FEET.

 ** MEMORY BANK #  2 CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1      269.84    12.29       4.572       96.67
 LONGEST FLOWPATH FROM NODE    503.00 TO NODE    685.00 =    4883.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc      INTENSITY
 NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1     277.58      12.29        4.572
     2     195.57      22.79        3.070

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     277.58   Tc(MIN.) =   12.29
 TOTAL AREA(ACRES) =      107.0

****************************************************************************
 FLOW PROCESS FROM NODE    685.00 TO NODE    685.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 2 <<<<<
```



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

****************************************************************************
 FLOW PROCESS FROM NODE    685.00 TO NODE    520.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   689.00  DOWNSTREAM(FEET) =   684.70
 FLOW LENGTH(FEET) =   262.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  45.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.24
 ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     277.58
 PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =   12.53
 LONGEST FLOWPATH FROM NODE    503.00 TO NODE    520.00 =    5145.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    520.00 TO NODE    520.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   12.53
 RAINFALL INTENSITY(INCH/HR) =   4.52
 TOTAL STREAM AREA(ACRES) =   107.04
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    277.58

****************************************************************************
 FLOW PROCESS FROM NODE    525.00 TO NODE    526.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6800
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   134.00
 UPSTREAM ELEVATION(FEET) =    719.30
 DOWNSTREAM ELEVATION(FEET) =    717.70
 ELEVATION DIFFERENCE(FEET) =      1.60
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.872
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    67.91
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.363
 SUBAREA RUNOFF(CFS) =      1.20
 TOTAL AREA(ACRES) =      0.24   TOTAL RUNOFF(CFS) =      1.20

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

```
 FLOW PROCESS FROM NODE    526.00 TO NODE    520.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  8 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  717.70  DOWNSTREAM ELEVATION(FEET) =  694.70
 STREET LENGTH(FEET) =   822.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.30
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.34
   HALFSTREET FLOOD WIDTH(FEET) =   10.90
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.94
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.36
 STREET FLOW TRAVEL TIME(MIN.) =   3.47   Tc(MIN.) =    9.35
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.456
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6800
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.680
 SUBAREA AREA(ACRES) =    4.84      SUBAREA RUNOFF(CFS) =   17.96
 TOTAL AREA(ACRES) =        5.1        PEAK FLOW RATE(CFS) =      18.85

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  13.95
 FLOW VELOCITY(FEET/SEC.) =  4.57   DEPTH*VELOCITY(FT*FT/SEC.) =   1.85
 LONGEST FLOWPATH FROM NODE    525.00 TO NODE    520.00 =     956.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    520.00 TO NODE    520.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    9.35
 RAINFALL INTENSITY(INCH/HR) =   5.46
 TOTAL STREAM AREA(ACRES) =     5.08
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     18.85

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



```
 FLOW PROCESS FROM NODE    522.00 TO NODE    523.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    96.00
 UPSTREAM ELEVATION(FEET) =    721.00
 DOWNSTREAM ELEVATION(FEET) =    719.00
 ELEVATION DIFFERENCE(FEET) =      2.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.955
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    81.25
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.168
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.93
 TOTAL AREA(ACRES) =      0.16   TOTAL RUNOFF(CFS) =      0.93

****************************************************************************
 FLOW PROCESS FROM NODE    523.00 TO NODE    524.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   719.00  DOWNSTREAM(FEET) =   700.00
 FLOW LENGTH(FEET) =  1940.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   3.58
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.93
 PIPE TRAVEL TIME(MIN.) =   9.03    Tc(MIN.) =   13.98
 LONGEST FLOWPATH FROM NODE    522.00 TO NODE    524.00 =    2036.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    523.00 TO NODE    524.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.208
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.7100
 SUBAREA AREA(ACRES) =   16.32   SUBAREA RUNOFF(CFS) =   48.75
 TOTAL AREA(ACRES) =       16.5   TOTAL RUNOFF(CFS) =      49.23
 TC(MIN.) =   13.98
```

```
**************************************************************************
 FLOW PROCESS FROM NODE    524.00 TO NODE    520.00 IS CODE =  31
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   696.00  DOWNSTREAM(FEET) =   694.70
 FLOW LENGTH(FEET) =    47.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  21.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  14.39
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      49.23
 PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   14.04
 LONGEST FLOWPATH FROM NODE    522.00 TO NODE    520.00 =    2083.00 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    520.00 TO NODE    520.00 IS CODE =   1
--------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==========================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION(MIN.) =   14.04
 RAINFALL INTENSITY(INCH/HR) =   4.20
 TOTAL STREAM AREA(ACRES) =    16.48
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     49.23

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1      277.58    12.53        4.515       107.04
     2       18.85     9.35        5.456         5.08
     3       49.23    14.04        4.197        16.48

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  3 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1      258.60     9.35       5.456
     2      337.13    12.53       4.515
     3      321.75    14.04       4.197

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     337.13   Tc(MIN.) =   12.53
 TOTAL AREA(ACRES) =      128.6
 LONGEST FLOWPATH FROM NODE    503.00 TO NODE    520.00 =    5145.00 FEET.

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



```
 FLOW PROCESS FROM NODE    520.00 TO NODE    703.00 IS CODE =  31
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   699.00  DOWNSTREAM(FEET) =   694.70
 FLOW LENGTH(FEET) =   131.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  54.0 INCH PIPE IS  42.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  24.88
 ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     337.13
 PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   12.62
 LONGEST FLOWPATH FROM NODE    503.00 TO NODE    703.00 =    5276.00 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    703.00 TO NODE    703.00 IS CODE =  10
--------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
==========================================================================

+------------------------------------------------------------------------+
| BEGIN BASIN 6 WEST HYD                                                 |
| 100 SERIES                                                             |
|                                                                        |
+------------------------------------------------------------------------+

**************************************************************************
 FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  21
--------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6700
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   124.00
 UPSTREAM ELEVATION(FEET) =    817.30
 DOWNSTREAM ELEVATION(FEET) =    816.00
 ELEVATION DIFFERENCE(FEET) =      1.30
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.177
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    65.73
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.127
 SUBAREA RUNOFF(CFS) =      0.67
 TOTAL AREA(ACRES) =      0.14   TOTAL RUNOFF(CFS) =      0.67

**************************************************************************
 FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  62
--------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
```

```
 >>>>>(STREET TABLE SECTION #  9 USED)<<<<<
================================================================================
  UPSTREAM ELEVATION(FEET) =  816.00  DOWNSTREAM ELEVATION(FEET) =  782.00
  STREET LENGTH(FEET) =   794.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      10.37
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.33
    HALFSTREET FLOOD WIDTH(FEET) =   10.02
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.62
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.51
  STREET FLOW TRAVEL TIME(MIN.) =   2.86   Tc(MIN.) =    9.04
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.574
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.670
  SUBAREA AREA(ACRES) =    5.14      SUBAREA RUNOFF(CFS) =   19.20
  TOTAL AREA(ACRES) =        5.3        PEAK FLOW RATE(CFS) =      19.72

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  13.04
  FLOW VELOCITY(FEET/SEC.) =  5.42   DEPTH*VELOCITY(FT*FT/SEC.) =   2.10
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    102.00 =     918.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   782.00  DOWNSTREAM(FEET) =   762.00
  FLOW LENGTH(FEET) =   372.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  12.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.02
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.72
  PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =    9.45
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    103.00 =    1290.00 FEET.

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



```
  FLOW PROCESS FROM NODE    102.00 TO NODE    103.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.416
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6700
  SUBAREA AREA(ACRES) =    2.68   SUBAREA RUNOFF(CFS) =    9.72
  TOTAL AREA(ACRES) =        8.0   TOTAL RUNOFF(CFS) =      28.88
  TC(MIN.) =    9.45

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   762.00  DOWNSTREAM(FEET) =   746.00
  FLOW LENGTH(FEET) =   396.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.66
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      28.88
  PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =    9.90
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    104.00 =    1686.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    104.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.256
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6700
  SUBAREA AREA(ACRES) =    1.86   SUBAREA RUNOFF(CFS) =    6.55
  TOTAL AREA(ACRES) =        9.8   TOTAL RUNOFF(CFS) =      34.58
  TC(MIN.) =    9.90

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    105.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   746.00  DOWNSTREAM(FEET) =   737.40
  FLOW LENGTH(FEET) =   229.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  16.4 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.14
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      34.58
  PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   10.16
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =    1915.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 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.) =   10.16
  RAINFALL INTENSITY(INCH/HR) =   5.17
  TOTAL STREAM AREA(ACRES) =     9.82
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     34.58

****************************************************************************
  FLOW PROCESS FROM NODE    110.00 TO NODE    111.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6700
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   149.00
  UPSTREAM ELEVATION(FEET) =    814.30
  DOWNSTREAM ELEVATION(FEET) =    813.00
  ELEVATION DIFFERENCE(FEET) =      1.30
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.335
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    61.17
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.011
  SUBAREA RUNOFF(CFS) =      0.89
  TOTAL AREA(ACRES) =      0.19   TOTAL RUNOFF(CFS) =      0.89

****************************************************************************
  FLOW PROCESS FROM NODE    111.00 TO NODE    112.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  9 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  813.00  DOWNSTREAM ELEVATION(FEET) =  790.00
  STREET LENGTH(FEET) =   494.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
```



```
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.06
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    7.10
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.07
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.09
  STREET FLOW TRAVEL TIME(MIN.) =   2.02   Tc(MIN.) =    8.36
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.864
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.670
  SUBAREA AREA(ACRES) =    2.11      SUBAREA RUNOFF(CFS) =    8.29
  TOTAL AREA(ACRES) =        2.3        PEAK FLOW RATE(CFS) =       9.04

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   9.25
  FLOW VELOCITY(FEET/SEC.) =  4.64   DEPTH*VELOCITY(FT*FT/SEC.) =   1.44
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    112.00 =     643.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    113.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   790.00  DOWNSTREAM(FEET) =   738.00
  FLOW LENGTH(FEET) =   600.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.91
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.04
  PIPE TRAVEL TIME(MIN.) =   0.67    Tc(MIN.) =    9.03
  LONGEST FLOWPATH FROM NODE    110.00 TO NODE    113.00 =    1243.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    112.00 TO NODE    113.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.579
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6700
```

```
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.6700
 SUBAREA AREA(ACRES) =    3.80   SUBAREA RUNOFF(CFS) =   14.20
 TOTAL AREA(ACRES) =        6.1   TOTAL RUNOFF(CFS) =      22.80
 TC(MIN.) =    9.03

****************************************************************************
 FLOW PROCESS FROM NODE    113.00 TO NODE    105.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   738.00  DOWNSTREAM(FEET) =   737.00
 FLOW LENGTH(FEET) =    47.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  14.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.11
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      22.80
 PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =    9.10
 LONGEST FLOWPATH FROM NODE    110.00 TO NODE    105.00 =    1290.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    105.00 TO NODE    105.00 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.) =    9.10
 RAINFALL INTENSITY(INCH/HR) =   5.55
 TOTAL STREAM AREA(ACRES) =     6.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     22.80

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       34.58    10.16        5.171          9.82
     2       22.80     9.10        5.551          6.10

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       53.78     9.10       5.551
     2       55.82    10.16       5.171

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      55.82   Tc(MIN.) =   10.16
```



```
 TOTAL AREA(ACRES) =       15.9
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    105.00 =    1915.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    105.00 TO NODE    106.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   737.00  DOWNSTREAM(FEET) =   729.00
 FLOW LENGTH(FEET) =   246.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  19.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  16.22
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      55.82
 PIPE TRAVEL TIME(MIN.) =   0.25    Tc(MIN.) =   10.41
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    106.00 =    2161.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   10.41
 RAINFALL INTENSITY(INCH/HR) =   5.09
 TOTAL STREAM AREA(ACRES) =    15.92
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     55.82

****************************************************************************
 FLOW PROCESS FROM NODE    114.00 TO NODE    115.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6700
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   142.00
 UPSTREAM ELEVATION(FEET) =    795.80
 DOWNSTREAM ELEVATION(FEET) =    794.00
 ELEVATION DIFFERENCE(FEET) =      1.80
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.941
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    69.01
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.308
 SUBAREA RUNOFF(CFS) =      1.42
 TOTAL AREA(ACRES) =      0.29   TOTAL RUNOFF(CFS) =      1.42
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    115.00 TO NODE    116.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  9 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  794.00  DOWNSTREAM ELEVATION(FEET) =  759.00
  STREET LENGTH(FEET) =   543.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.27
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    8.27
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.16
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.50
  STREET FLOW TRAVEL TIME(MIN.) =   1.76   Tc(MIN.) =    7.70
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.184
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.670
  SUBAREA AREA(ACRES) =    3.29      SUBAREA RUNOFF(CFS) =   13.63
  TOTAL AREA(ACRES) =        3.6        PEAK FLOW RATE(CFS) =      14.83

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.65
  FLOW VELOCITY(FEET/SEC.) =  5.92   DEPTH*VELOCITY(FT*FT/SEC.) =   2.01
  LONGEST FLOWPATH FROM NODE    114.00 TO NODE    116.00 =     685.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    117.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   759.00  DOWNSTREAM(FEET) =   729.30
  FLOW LENGTH(FEET) =   646.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.34
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      14.83
```



```
  PIPE TRAVEL TIME(MIN.) =   0.81    Tc(MIN.) =    8.50
  LONGEST FLOWPATH FROM NODE    114.00 TO NODE    117.00 =    1331.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    116.00 TO NODE    117.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.799
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6700
  SUBAREA AREA(ACRES) =    3.98   SUBAREA RUNOFF(CFS) =   15.46
  TOTAL AREA(ACRES) =        7.6   TOTAL RUNOFF(CFS) =      29.37
  TC(MIN.) =    8.50

****************************************************************************
  FLOW PROCESS FROM NODE    117.00 TO NODE    106.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   729.30  DOWNSTREAM(FEET) =   729.00
  FLOW LENGTH(FEET) =    54.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  24.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.92
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      29.37
  PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =    8.63
  LONGEST FLOWPATH FROM NODE    114.00 TO NODE    106.00 =    1385.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 TO NODE    106.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.63
  RAINFALL INTENSITY(INCH/HR) =   5.74
  TOTAL STREAM AREA(ACRES) =     7.56
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     29.37

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       55.82    10.41        5.090         15.92
      2       29.37     8.63        5.742          7.56
```

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       78.85     8.63       5.742
     2       81.86    10.41       5.090

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      81.86   Tc(MIN.) =   10.41
 TOTAL AREA(ACRES) =       23.5
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    106.00 =    2161.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    106.00 TO NODE    107.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   729.00  DOWNSTREAM(FEET) =   726.00
 FLOW LENGTH(FEET) =    56.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  21.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  21.28
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      81.86
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   10.45
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    107.00 =    2217.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    106.00 TO NODE    107.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.076
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6800
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.6708
 SUBAREA AREA(ACRES) =    1.95   SUBAREA RUNOFF(CFS) =    6.73
 TOTAL AREA(ACRES) =       25.4   TOTAL RUNOFF(CFS) =      86.59
 TC(MIN.) =   10.45

****************************************************************************
 FLOW PROCESS FROM NODE    107.00 TO NODE    108.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   726.00  DOWNSTREAM(FEET) =   716.00
 FLOW LENGTH(FEET) =   209.00   MANNING'S N =  0.013
```



```
 DEPTH OF FLOW IN  30.0 INCH PIPE IS  24.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  20.31
 ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      86.59
 PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   10.62
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    108.00 =    2426.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    125.00 TO NODE    126.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6800
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    94.00
 UPSTREAM ELEVATION(FEET) =    747.50
 DOWNSTREAM ELEVATION(FEET) =    745.00
 ELEVATION DIFFERENCE(FEET) =      2.50
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.174
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    89.89
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.990
 SUBAREA RUNOFF(CFS) =      0.76
 TOTAL AREA(ACRES) =      0.14   TOTAL RUNOFF(CFS) =      0.76

****************************************************************************
 FLOW PROCESS FROM NODE    126.00 TO NODE    127.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  9 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  745.00  DOWNSTREAM ELEVATION(FEET) =  731.00
 STREET LENGTH(FEET) =   502.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
```

```
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.05
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.30
   HALFSTREET FLOOD WIDTH(FEET) =    8.68
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.47
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.04
 STREET FLOW TRAVEL TIME(MIN.) =   2.41   Tc(MIN.) =    7.58
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.244
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6800
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.680
 SUBAREA AREA(ACRES) =    2.47      SUBAREA RUNOFF(CFS) =   10.49
 TOTAL AREA(ACRES) =        2.6        PEAK FLOW RATE(CFS) =      11.08

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  11.29
 FLOW VELOCITY(FEET/SEC.) =  3.98   DEPTH*VELOCITY(FT*FT/SEC.) =   1.40
 LONGEST FLOWPATH FROM NODE    125.00 TO NODE    127.00 =     596.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    127.00 TO NODE    128.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   731.00  DOWNSTREAM(FEET) =   728.00
 FLOW LENGTH(FEET) =   248.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  14.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   7.26
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      11.08
 PIPE TRAVEL TIME(MIN.) =   0.57    Tc(MIN.) =    8.15
 LONGEST FLOWPATH FROM NODE    125.00 TO NODE    128.00 =     844.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    128.00 TO NODE    128.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    8.15
 RAINFALL INTENSITY(INCH/HR) =   5.96
 TOTAL STREAM AREA(ACRES) =     2.61
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     11.08

****************************************************************************
 FLOW PROCESS FROM NODE    132.00 TO NODE    133.00 IS CODE =  21
```



```
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6800
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   153.00
 UPSTREAM ELEVATION(FEET) =    738.50
 DOWNSTREAM ELEVATION(FEET) =    735.00
 ELEVATION DIFFERENCE(FEET) =      3.50
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.269
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    84.31
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.897
 SUBAREA RUNOFF(CFS) =      1.61
 TOTAL AREA(ACRES) =      0.30   TOTAL RUNOFF(CFS) =      1.61

****************************************************************************
 FLOW PROCESS FROM NODE    133.00 TO NODE    134.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  9 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  735.00  DOWNSTREAM ELEVATION(FEET) =  729.00
 STREET LENGTH(FEET) =   250.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.82
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.30
   HALFSTREET FLOOD WIDTH(FEET) =    8.79
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.26
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.99
 STREET FLOW TRAVEL TIME(MIN.) =   1.28   Tc(MIN.) =    6.55
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.865
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6800
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.680
 SUBAREA AREA(ACRES) =    1.80      SUBAREA RUNOFF(CFS) =    8.40
```

```
  TOTAL AREA(ACRES) =        2.1        PEAK FLOW RATE(CFS) =       9.80

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  11.00
  FLOW VELOCITY(FEET/SEC.) =  3.69   DEPTH*VELOCITY(FT*FT/SEC.) =   1.28
  LONGEST FLOWPATH FROM NODE    132.00 TO NODE    134.00 =     403.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    134.00 TO NODE    128.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   729.00  DOWNSTREAM(FEET) =   728.00
  FLOW LENGTH(FEET) =     5.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.62
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.80
  PIPE TRAVEL TIME(MIN.) =   0.00    Tc(MIN.) =    6.55
  LONGEST FLOWPATH FROM NODE    132.00 TO NODE    128.00 =     408.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    128.00 TO NODE    128.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.55
  RAINFALL INTENSITY(INCH/HR) =   6.86
  TOTAL STREAM AREA(ACRES) =     2.10
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.80

****************************************************************************
  FLOW PROCESS FROM NODE    135.00 TO NODE    136.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6800
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   126.00
  UPSTREAM ELEVATION(FEET) =    734.50
  DOWNSTREAM ELEVATION(FEET) =    733.00
  ELEVATION DIFFERENCE(FEET) =      1.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.876
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    67.86
           (Reference: Table 3-1B of Hydrology Manual)
```



```
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.360
  SUBAREA RUNOFF(CFS) =      1.60
  TOTAL AREA(ACRES) =      0.32   TOTAL RUNOFF(CFS) =      1.60

****************************************************************************
  FLOW PROCESS FROM NODE    136.00 TO NODE    137.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  9 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  733.00  DOWNSTREAM ELEVATION(FEET) =  728.50
  STREET LENGTH(FEET) =   433.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.45
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.33
    HALFSTREET FLOOD WIDTH(FEET) =   10.30
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.31
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.77
  STREET FLOW TRAVEL TIME(MIN.) =   3.13   Tc(MIN.) =    9.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.590
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6800
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.680
  SUBAREA AREA(ACRES) =    2.00      SUBAREA RUNOFF(CFS) =    7.60
  TOTAL AREA(ACRES) =        2.3        PEAK FLOW RATE(CFS) =       8.82

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  12.55
  FLOW VELOCITY(FEET/SEC.) =  2.60   DEPTH*VELOCITY(FT*FT/SEC.) =   0.98
  LONGEST FLOWPATH FROM NODE    135.00 TO NODE    137.00 =     559.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    137.00 TO NODE    128.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   728.50  DOWNSTREAM(FEET) =   728.00
```

```
 FLOW LENGTH(FEET) =    51.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.0 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.46
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       8.82
 PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =    9.13
 LONGEST FLOWPATH FROM NODE    135.00 TO NODE    128.00 =     610.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    128.00 TO NODE    128.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION(MIN.) =    9.13
 RAINFALL INTENSITY(INCH/HR) =   5.54
 TOTAL STREAM AREA(ACRES) =     2.32
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.82

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       11.08     8.15        5.960          2.61
     2        9.80     6.55        6.863          2.10
     3        8.82     9.13        5.538          2.32

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  3 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       25.03     6.55       6.863
     2       27.47     8.15       5.960
     3       27.03     9.13       5.538

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      27.47   Tc(MIN.) =    8.15
 TOTAL AREA(ACRES) =        7.0
 LONGEST FLOWPATH FROM NODE    125.00 TO NODE    128.00 =     844.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    128.00 TO NODE    129.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   728.00  DOWNSTREAM(FEET) =   722.00
 FLOW LENGTH(FEET) =   206.00   MANNING'S N =  0.013
```



```
 DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.07
 ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      27.47
 PIPE TRAVEL TIME(MIN.) =   0.26    Tc(MIN.) =    8.41
 LONGEST FLOWPATH FROM NODE    125.00 TO NODE    129.00 =    1050.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    128.00 TO NODE    129.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.839
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6800
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.6800
 SUBAREA AREA(ACRES) =    1.79   SUBAREA RUNOFF(CFS) =    7.11
 TOTAL AREA(ACRES) =        8.8   TOTAL RUNOFF(CFS) =      35.02
 TC(MIN.) =    8.41

****************************************************************************
 FLOW PROCESS FROM NODE    129.00 TO NODE    130.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   722.00  DOWNSTREAM(FEET) =   721.80
 FLOW LENGTH(FEET) =    96.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  39.0 INCH PIPE IS  30.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   5.04
 ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      35.02
 PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =    8.73
 LONGEST FLOWPATH FROM NODE    125.00 TO NODE    130.00 =    1146.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    129.00 TO NODE    130.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.701
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6800
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.6800
 SUBAREA AREA(ACRES) =    3.30   SUBAREA RUNOFF(CFS) =   12.79
 TOTAL AREA(ACRES) =       12.1   TOTAL RUNOFF(CFS) =      46.99
 TC(MIN.) =    8.73

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

```
 FLOW PROCESS FROM NODE    130.00 TO NODE    131.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   721.80  DOWNSTREAM(FEET) =   717.00
 FLOW LENGTH(FEET) =   435.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.27
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      46.99
 PIPE TRAVEL TIME(MIN.) =   0.71    Tc(MIN.) =    9.44
 LONGEST FLOWPATH FROM NODE    125.00 TO NODE    131.00 =    1581.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    130.00 TO NODE    131.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.422
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6800
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.6800
 SUBAREA AREA(ACRES) =    2.72   SUBAREA RUNOFF(CFS) =   10.03
 TOTAL AREA(ACRES) =       14.8   TOTAL RUNOFF(CFS) =      54.72
 TC(MIN.) =    9.44

****************************************************************************
 FLOW PROCESS FROM NODE    131.00 TO NODE    108.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   717.00  DOWNSTREAM(FEET) =   716.00
 FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  25.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.31
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      54.72
 PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =    9.60
 LONGEST FLOWPATH FROM NODE    125.00 TO NODE    108.00 =    1681.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
```



```
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1       54.72     9.60       5.363       14.84
 LONGEST FLOWPATH FROM NODE    125.00 TO NODE    108.00 =    1681.00 FEET.

 ** MEMORY BANK #  3 CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1       86.59    10.62       5.023       25.43
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    108.00 =    2426.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc      INTENSITY
 NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1     132.94       9.60        5.363
     2     137.83      10.62        5.023

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     137.83   Tc(MIN.) =   10.62
 TOTAL AREA(ACRES) =       40.3

****************************************************************************
 FLOW PROCESS FROM NODE    108.00 TO NODE    108.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    108.00 TO NODE    109.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   716.00  DOWNSTREAM(FEET) =   715.50
 FLOW LENGTH(FEET) =   130.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  43.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   9.04
 ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     137.83
 PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =   10.86
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    109.00 =    2556.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    108.00 TO NODE    109.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.951
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6700
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.6740
```

```
  SUBAREA AREA(ACRES) =    1.19   SUBAREA RUNOFF(CFS) =    3.95
  TOTAL AREA(ACRES) =       41.5   TOTAL RUNOFF(CFS) =     138.37
  TC(MIN.) =   10.86

****************************************************************************
  FLOW PROCESS FROM NODE    109.00 TO NODE    669.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   715.50  DOWNSTREAM(FEET) =   715.00
  FLOW LENGTH(FEET) =    26.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  31.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.60
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     138.37
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   10.89
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    669.00 =    2582.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    669.00 TO NODE    669.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    118.00 TO NODE    119.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6700
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   200.00
  UPSTREAM ELEVATION(FEET) =    814.00
  DOWNSTREAM ELEVATION(FEET) =    793.00
  ELEVATION DIFFERENCE(FEET) =     21.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.593
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.168
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.77
  TOTAL AREA(ACRES) =      0.14   TOTAL RUNOFF(CFS) =      0.77

****************************************************************************
  FLOW PROCESS FROM NODE    119.00 TO NODE    120.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
```



```
  >>>>>(STREET TABLE SECTION #  9 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  793.00  DOWNSTREAM ELEVATION(FEET) =  743.00
  STREET LENGTH(FEET) =   900.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.19
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.33
    HALFSTREET FLOOD WIDTH(FEET) =   10.16
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.30
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.75
  STREET FLOW TRAVEL TIME(MIN.) =   2.83   Tc(MIN.) =    6.42
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.948
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6700
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.670
  SUBAREA AREA(ACRES) =    4.86      SUBAREA RUNOFF(CFS) =   22.62
  TOTAL AREA(ACRES) =        5.0        PEAK FLOW RATE(CFS) =      23.28

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.39   HALFSTREET FLOOD WIDTH(FEET) =  13.25
  FLOW VELOCITY(FEET/SEC.) =  6.21   DEPTH*VELOCITY(FT*FT/SEC.) =   2.43
  LONGEST FLOWPATH FROM NODE    118.00 TO NODE    120.00 =    1100.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    120.00 TO NODE    121.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   743.00  DOWNSTREAM(FEET) =   725.00
  FLOW LENGTH(FEET) =   484.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.70
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      23.28
  PIPE TRAVEL TIME(MIN.) =   0.59    Tc(MIN.) =    7.01
  LONGEST FLOWPATH FROM NODE    118.00 TO NODE    121.00 =    1584.00 FEET.

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

```
 FLOW PROCESS FROM NODE    120.00 TO NODE    121.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.566
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .6700
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.6700
 SUBAREA AREA(ACRES) =    2.90   SUBAREA RUNOFF(CFS) =   12.76
 TOTAL AREA(ACRES) =        7.9   TOTAL RUNOFF(CFS) =      34.75
 TC(MIN.) =    7.01

****************************************************************************
 FLOW PROCESS FROM NODE    121.00 TO NODE    121.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    7.01
 RAINFALL INTENSITY(INCH/HR) =   6.57
 TOTAL STREAM AREA(ACRES) =     7.90
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     34.75

****************************************************************************
 FLOW PROCESS FROM NODE    122.00 TO NODE    123.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5200
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
 UPSTREAM ELEVATION(FEET) =    730.00
 DOWNSTREAM ELEVATION(FEET) =    729.00
 ELEVATION DIFFERENCE(FEET) =      1.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.756
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.154
 SUBAREA RUNOFF(CFS) =      0.26
 TOTAL AREA(ACRES) =      0.08   TOTAL RUNOFF(CFS) =      0.26

****************************************************************************
 FLOW PROCESS FROM NODE    123.00 TO NODE    121.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   729.00  DOWNSTREAM(FEET) =   725.00
 FLOW LENGTH(FEET) =   320.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
```



```
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   1.9 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   2.65
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.26
 PIPE TRAVEL TIME(MIN.) =   2.01    Tc(MIN.) =    9.77
 LONGEST FLOWPATH FROM NODE    122.00 TO NODE    121.00 =     390.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    123.00 TO NODE    121.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.303
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5200
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5200
 SUBAREA AREA(ACRES) =    1.47   SUBAREA RUNOFF(CFS) =    4.05
 TOTAL AREA(ACRES) =        1.6   TOTAL RUNOFF(CFS) =       4.27
 TC(MIN.) =    9.77

****************************************************************************
 FLOW PROCESS FROM NODE    121.00 TO NODE    121.00 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) =   5.30
 TOTAL STREAM AREA(ACRES) =     1.55
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.27

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       34.75     7.01        6.566          7.90
     2        4.27     9.77        5.303          1.55

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       37.82     7.01       6.566
     2       32.35     9.77       5.303

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     37.82   Tc(MIN.) =    7.01
```

```
 TOTAL AREA(ACRES) =        9.4
 LONGEST FLOWPATH FROM NODE    118.00 TO NODE    121.00 =    1584.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    121.00 TO NODE    668.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   725.00  DOWNSTREAM(FEET) =   716.00
 FLOW LENGTH(FEET) =   334.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  27.0 INCH PIPE IS  17.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  13.72
 ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      37.82
 PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =    7.42
 LONGEST FLOWPATH FROM NODE    118.00 TO NODE    668.00 =    1918.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    668.00 TO NODE    668.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    7.42
 RAINFALL INTENSITY(INCH/HR) =   6.33
 TOTAL STREAM AREA(ACRES) =     9.45
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     37.82

****************************************************************************
 FLOW PROCESS FROM NODE    665.00 TO NODE    666.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .8500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   165.00
 UPSTREAM ELEVATION(FEET) =    767.80
 DOWNSTREAM ELEVATION(FEET) =    764.50
 ELEVATION DIFFERENCE(FEET) =      3.30
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.195
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    80.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.168
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      2.29
 TOTAL AREA(ACRES) =      0.33   TOTAL RUNOFF(CFS) =      2.29
```



```
****************************************************************************
 FLOW PROCESS FROM NODE    666.00 TO NODE    668.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  5 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  764.50  DOWNSTREAM ELEVATION(FEET) =  716.00
 STREET LENGTH(FEET) =  1376.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      15.07
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.37
   HALFSTREET FLOOD WIDTH(FEET) =   12.15
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.73
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.75
 STREET FLOW TRAVEL TIME(MIN.) =   4.85   Tc(MIN.) =    8.05
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.009
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .8500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.850
 SUBAREA AREA(ACRES) =    4.90      SUBAREA RUNOFF(CFS) =   25.03
 TOTAL AREA(ACRES) =        5.2        PEAK FLOW RATE(CFS) =      26.71

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.43   HALFSTREET FLOOD WIDTH(FEET) =  15.35
 FLOW VELOCITY(FEET/SEC.) =  5.40   DEPTH*VELOCITY(FT*FT/SEC.) =   2.34
 LONGEST FLOWPATH FROM NODE    665.00 TO NODE    668.00 =    1541.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    668.00 TO NODE    668.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    8.05
 RAINFALL INTENSITY(INCH/HR) =   6.01
 TOTAL STREAM AREA(ACRES) =     5.23
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     26.71
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    689.00 TO NODE    690.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5200
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   246.00
  UPSTREAM ELEVATION(FEET) =    772.20
  DOWNSTREAM ELEVATION(FEET) =    768.00
  ELEVATION DIFFERENCE(FEET) =      4.20
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.596
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    75.61
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.237
  SUBAREA RUNOFF(CFS) =      0.81
  TOTAL AREA(ACRES) =      0.25   TOTAL RUNOFF(CFS) =      0.81

****************************************************************************
  FLOW PROCESS FROM NODE    690.00 TO NODE    668.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   768.00  DOWNSTREAM(FEET) =   716.00
  FLOW LENGTH(FEET) =  1300.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.65
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.81
  PIPE TRAVEL TIME(MIN.) =   3.83    Tc(MIN.) =   11.43
  LONGEST FLOWPATH FROM NODE    689.00 TO NODE    668.00 =    1546.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    690.00 TO NODE    668.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.792
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5200
  SUBAREA AREA(ACRES) =   16.75   SUBAREA RUNOFF(CFS) =   41.74
  TOTAL AREA(ACRES) =       17.0   TOTAL RUNOFF(CFS) =      42.36
  TC(MIN.) =   11.43
```



```
****************************************************************************
  FLOW PROCESS FROM NODE    668.00 TO NODE    668.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =   11.43
  RAINFALL INTENSITY(INCH/HR) =   4.79
  TOTAL STREAM AREA(ACRES) =    17.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     42.36

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       37.82     7.42        6.332          9.45
      2       26.71     8.05        6.009          5.23
      3       42.36    11.43        4.792         17.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       89.95     7.42       6.332
      2       92.43     8.05       6.009
      3       92.29    11.43       4.792

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      92.43   Tc(MIN.) =    8.05
  TOTAL AREA(ACRES) =       31.7
  LONGEST FLOWPATH FROM NODE    118.00 TO NODE    668.00 =    1918.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    668.00 TO NODE    669.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   716.00  DOWNSTREAM(FEET) =   715.00
  FLOW LENGTH(FEET) =    58.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  28.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.36
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      92.43
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =    8.11
  LONGEST FLOWPATH FROM NODE    118.00 TO NODE    669.00 =    1976.00 FEET.
```

```
**************************************************************************
 FLOW PROCESS FROM NODE    669.00 TO NODE    669.00 IS CODE =  11
--------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 3 WITH THE MAIN-STREAM MEMORY<<<<<
==========================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1       92.43     8.11       5.977       31.68
 LONGEST FLOWPATH FROM NODE    118.00 TO NODE    669.00 =    1976.00 FEET.

 ** MEMORY BANK #  3 CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1      138.37    10.89       4.944       41.46
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    669.00 =    2582.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc      INTENSITY
 NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1     195.53       8.11        5.977
     2     214.82      10.89        4.944

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     214.82   Tc(MIN.) =   10.89
 TOTAL AREA(ACRES) =       73.1

**************************************************************************
 FLOW PROCESS FROM NODE    669.00 TO NODE    669.00 IS CODE =  12
--------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 3 <<<<<
==========================================================================

**************************************************************************
 FLOW PROCESS FROM NODE    669.00 TO NODE    670.00 IS CODE =  31
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   715.00  DOWNSTREAM(FEET) =   707.00
 FLOW LENGTH(FEET) =   850.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  43.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  14.13
 ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     214.82
 PIPE TRAVEL TIME(MIN.) =   1.00    Tc(MIN.) =   11.89
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    670.00 =    3432.00 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    669.00 TO NODE    670.00 IS CODE =  81
```



```
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.671
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .8500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.6579
 SUBAREA AREA(ACRES) =    4.11   SUBAREA RUNOFF(CFS) =   16.32
 TOTAL AREA(ACRES) =       77.2   TOTAL RUNOFF(CFS) =     237.39
 TC(MIN.) =   11.89

**************************************************************************
 FLOW PROCESS FROM NODE    670.00 TO NODE    697.00 IS CODE =  31
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   707.00  DOWNSTREAM(FEET) =   700.00
 FLOW LENGTH(FEET) =   757.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  60.0 INCH PIPE IS  47.8 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  14.17
 ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     237.39
 PIPE TRAVEL TIME(MIN.) =   0.89    Tc(MIN.) =   12.78
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    697.00 =    4189.00 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    697.00 TO NODE    697.00 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.) =   12.78
 RAINFALL INTENSITY(INCH/HR) =   4.46
 TOTAL STREAM AREA(ACRES) =    77.25
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    237.39

**************************************************************************
 FLOW PROCESS FROM NODE    694.00 TO NODE    695.00 IS CODE =  21
--------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5200
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   110.00
 UPSTREAM ELEVATION(FEET) =    710.00
 DOWNSTREAM ELEVATION(FEET) =    708.00
 ELEVATION DIFFERENCE(FEET) =      2.00
```

```
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.519
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    77.27
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.278
 SUBAREA RUNOFF(CFS) =      0.91
 TOTAL AREA(ACRES) =      0.28   TOTAL RUNOFF(CFS) =      0.91

****************************************************************************
 FLOW PROCESS FROM NODE    695.00 TO NODE    697.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   708.00  DOWNSTREAM(FEET) =   700.00
 FLOW LENGTH(FEET) =   564.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.07
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.91
 PIPE TRAVEL TIME(MIN.) =   2.31    Tc(MIN.) =    9.83
 LONGEST FLOWPATH FROM NODE    694.00 TO NODE    697.00 =     674.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    695.00 TO NODE    697.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.281
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5200
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5200
 SUBAREA AREA(ACRES) =    2.84   SUBAREA RUNOFF(CFS) =    7.80
 TOTAL AREA(ACRES) =        3.1   TOTAL RUNOFF(CFS) =       8.57
 TC(MIN.) =    9.83

****************************************************************************
 FLOW PROCESS FROM NODE    697.00 TO NODE    697.00 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.) =    9.83
 RAINFALL INTENSITY(INCH/HR) =   5.28
 TOTAL STREAM AREA(ACRES) =     3.12
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.57
```



```
 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1      237.39    12.78        4.458         77.25
     2        8.57     9.83        5.281          3.12

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF       Tc      INTENSITY
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)
     1      191.13     9.83        5.281
     2      244.62    12.78        4.458

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     244.62   Tc(MIN.) =   12.78
 TOTAL AREA(ACRES) =       80.4
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    697.00 =    4189.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    697.00 TO NODE    702.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   700.00  DOWNSTREAM(FEET) =   699.00
 FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  54.0 INCH PIPE IS  40.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  19.29
 ESTIMATED PIPE DIAMETER(INCH) =  54.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     244.62
 PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =   12.83
 LONGEST FLOWPATH FROM NODE    100.00 TO NODE    702.00 =    4239.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    702.00 TO NODE    702.00 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) =   4.45
 TOTAL STREAM AREA(ACRES) =    80.37
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    244.62

****************************************************************************
 FLOW PROCESS FROM NODE    700.00 TO NODE    701.00 IS CODE =  21
----------------------------------------------------------------------------
```

```
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    80.00
  UPSTREAM ELEVATION(FEET) =    707.00
  DOWNSTREAM ELEVATION(FEET) =    706.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.464
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    68.75
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.168
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      1.04
  TOTAL AREA(ACRES) =      0.15   TOTAL RUNOFF(CFS) =      1.04

****************************************************************************
  FLOW PROCESS FROM NODE    701.00 TO NODE    702.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  4 USED)<<<<<
==============================================================================
  UPSTREAM ELEVATION(FEET) =  706.00  DOWNSTREAM ELEVATION(FEET) =  699.00
  STREET LENGTH(FEET) =   721.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.23
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.36
    HALFSTREET FLOOD WIDTH(FEET) =   11.76
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.41
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.87
  STREET FLOW TRAVEL TIME(MIN.) =   4.99   Tc(MIN.) =    8.45
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.820
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.850
  SUBAREA AREA(ACRES) =    2.44      SUBAREA RUNOFF(CFS) =   12.07
```



```
  TOTAL AREA(ACRES) =        2.6        PEAK FLOW RATE(CFS) =      12.81

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  14.80
  FLOW VELOCITY(FEET/SEC.) =  2.77   DEPTH*VELOCITY(FT*FT/SEC.) =   1.17
  LONGEST FLOWPATH FROM NODE    700.00 TO NODE    702.00 =     801.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    702.00 TO NODE    702.00 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.) =    8.45
  RAINFALL INTENSITY(INCH/HR) =   5.82
  TOTAL STREAM AREA(ACRES) =     2.59
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     12.81

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      244.62    12.83        4.448         80.37
      2       12.81     8.45        5.820          2.59

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      199.77     8.45       5.820
      2      254.41    12.83       4.448

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     254.41   Tc(MIN.) =   12.83
  TOTAL AREA(ACRES) =       83.0
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    702.00 =    4239.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    702.00 TO NODE    703.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   699.00  DOWNSTREAM(FEET) =   697.00
  FLOW LENGTH(FEET) =   152.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  43.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.72
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =     254.41
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =   12.98
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    703.00 =    4391.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    703.00 TO NODE    703.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1      254.41    12.98       4.415       82.96
  LONGEST FLOWPATH FROM NODE    100.00 TO NODE    703.00 =    4391.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1      337.13    12.62       4.495      128.60
  LONGEST FLOWPATH FROM NODE    503.00 TO NODE    703.00 =    5276.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1     584.56      12.62        4.495
      2     585.54      12.98        4.415

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     585.54   Tc(MIN.) =   12.98
  TOTAL AREA(ACRES) =      211.6

****************************************************************************
  FLOW PROCESS FROM NODE    703.00 TO NODE    703.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    703.00 TO NODE    707.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   697.00  DOWNSTREAM(FEET) =   690.00
  FLOW LENGTH(FEET) =   291.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  54.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  25.67
  ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     585.54
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   13.17
```



```
  LONGEST FLOWPATH FROM NODE    503.00 TO NODE    707.00 =    5567.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    707.00 TO NODE    707.00 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.) =   13.17
  RAINFALL INTENSITY(INCH/HR) =   4.37
  TOTAL STREAM AREA(ACRES) =   211.56
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    585.54

****************************************************************************
  FLOW PROCESS FROM NODE    705.00 TO NODE    706.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5200
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    87.00
  UPSTREAM ELEVATION(FEET) =    704.00
  DOWNSTREAM ELEVATION(FEET) =    702.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.271
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    84.48
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.415
  SUBAREA RUNOFF(CFS) =      0.67
  TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.67

****************************************************************************
  FLOW PROCESS FROM NODE    706.00 TO NODE    707.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    702.00  DOWNSTREAM(FEET) =    690.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   709.00   CHANNEL SLOPE =  0.0169
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.67
  FLOW VELOCITY(FEET/SEC) =   1.95 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   6.06   Tc(MIN.) =   13.33
  LONGEST FLOWPATH FROM NODE    705.00 TO NODE    707.00 =     796.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    706.00 TO NODE    707.00 IS CODE =  81
```

```
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.340
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5200
  SUBAREA AREA(ACRES) =    6.80   SUBAREA RUNOFF(CFS) =   15.35
  TOTAL AREA(ACRES) =        7.0   TOTAL RUNOFF(CFS) =      15.80
  TC(MIN.) =   13.33

************************************************************************
  FLOW PROCESS FROM NODE    707.00 TO NODE    707.00 IS CODE =   1
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   13.33
  RAINFALL INTENSITY(INCH/HR) =   4.34
  TOTAL STREAM AREA(ACRES) =     7.00
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     15.80

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      585.54    13.17        4.374        211.56
      2       15.80    13.33        4.340          7.00

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      601.15    13.17       4.374
      2      596.81    13.33       4.340

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     601.15   Tc(MIN.) =   13.17
  TOTAL AREA(ACRES) =      218.6
  LONGEST FLOWPATH FROM NODE    503.00 TO NODE    707.00 =    5567.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    707.00 TO NODE      1.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
```



```
  ELEVATION DATA: UPSTREAM(FEET) =   690.00  DOWNSTREAM(FEET) =   653.50
  FLOW LENGTH(FEET) =   115.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  33.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  68.09
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     601.15
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   13.19
  LONGEST FLOWPATH FROM NODE    503.00 TO NODE      1.00 =    5682.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    707.00 TO NODE      1.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.368
   *USER SPECIFIED(SUBAREA):
   RESIDENTIAL (7.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
   S.C.S. CURVE NUMBER (AMC II) =   0
   AREA-AVERAGE RUNOFF COEFFICIENT = 0.6111
   SUBAREA AREA(ACRES) =    5.94   SUBAREA RUNOFF(CFS) =    9.08
   TOTAL AREA(ACRES) =      224.5   TOTAL RUNOFF(CFS) =     601.15
   TC(MIN.) =   13.19
   NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

+----------------------------------------------------------------------+
| APPLY CODE 7 IN BASIN 1 FOR ATTENUATED OUTFLOW                       |
|                                                                      |
|                                                                      |
+----------------------------------------------------------------------+

************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      1.00 IS CODE =   7
------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
========================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  28.26   RAIN INTENSITY(INCH/HOUR) =  2.67
  TOTAL AREA(ACRES) =   224.50   TOTAL RUNOFF(CFS) =    279.50

************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE     28.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   653.50  DOWNSTREAM(FEET) =   650.00
  FLOW LENGTH(FEET) =   109.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  51.0 INCH PIPE IS  39.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.65
  ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     279.50
```

```
 PIPE TRAVEL TIME(MIN.) =   0.08    Tc(MIN.) =   28.34
 LONGEST FLOWPATH FROM NODE    503.00 TO NODE     28.00 =    5791.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     28.00 TO NODE     28.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1      279.50    28.34       2.668      224.50
 LONGEST FLOWPATH FROM NODE    503.00 TO NODE     28.00 =    5791.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1      541.48    19.49       3.396      423.98
 LONGEST FLOWPATH FROM NODE    850.00 TO NODE     28.00 =   10870.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc      INTENSITY
 NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1     733.71      19.49        3.396
     2     704.84      28.34        2.668

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     733.71   Tc(MIN.) =   19.49
 TOTAL AREA(ACRES) =      648.5

****************************************************************************
 FLOW PROCESS FROM NODE     28.00 TO NODE     28.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE     28.00 TO NODE     29.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   650.00  DOWNSTREAM(FEET) =   620.00
 FLOW LENGTH(FEET) =   520.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  66.0 INCH PIPE IS  50.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  37.60
 ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     733.71
 PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   19.72
 LONGEST FLOWPATH FROM NODE    850.00 TO NODE     29.00 =   11390.00 FEET.
```



```
+----------------------------------------------------------------------------+
| END OF ZONE 2 HYD                                                          |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+
============================================================================
 END OF STUDY SUMMARY:
 TOTAL AREA(ACRES)     =      648.5  TC(MIN.) =     19.72
 PEAK FLOW RATE(CFS)   =     733.71
============================================================================
============================================================================
 END OF RATIONAL METHOD ANALYSIS
```

CHAPTER 5

5.1.3 – Rational Method Hydrologic Analysis (AES 2015)

AES Zone 3

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

          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                       2003,1985,1981 HYDROLOGY MANUAL
       (c) Copyright 1982-2015 Advanced Engineering Software (aes)
           Ver. 22.0 Release Date: 07/01/2015  License ID 1239

                        Analysis prepared by:




------------------------------------------------------------------------
  FILE NAME: R:\1235\HYD\CALCS\AES\SRP\ATT\ZONE3.DAT
  TIME/DATE OF STUDY: 17:25 11/04/2019
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.100
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *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   20.0      10.0    0.020/0.020/0.020   0.50    1.50 0.0312 0.125 0.0150
  2   20.0      10.0    0.020/0.020/0.020   0.50    1.50 0.0312 0.125 0.0150
  3   20.0      10.0    0.020/0.020/0.020   0.50    1.50 0.0312 0.125 0.0150
  4   20.0      10.0    0.020/0.020/0.020   0.50    1.50 0.0312 0.125 0.0150
  5   20.0      10.0    0.020/0.020/0.020   0.50    1.50 0.0312 0.125 0.0150
  6   20.0      10.0    0.020/0.020/0.020   0.50    1.50 0.0312 0.125 0.0150
  7   16.0       8.0    0.020/0.020/0.020   0.50    1.50 0.0312 0.125 0.0150
  8   20.0      10.0    0.020/0.020/0.020   0.50    1.50 0.0312 0.125 0.0150
  9   18.0       9.0    0.020/0.020/0.020   0.50    1.50 0.0312 0.125 0.0150
 10   17.0      10.0    0.020/0.020/0.020   0.50    1.50 0.0312 0.125 0.0150
 11   14.0       7.0    0.020/0.020/0.020   0.50    1.50 0.0312 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
```



```
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

+----------------------------------------------------------------------+
| BEGIN ZONE 3 HYD                                                     |
| EAST SIDE BAPASS (SOUTH WATER TANK TO NORTH BASIN 2 CULVERT)         |
|                                                                      |
+----------------------------------------------------------------------+

************************************************************************
  FLOW PROCESS FROM NODE    957.00 TO NODE    958.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   134.00
  UPSTREAM ELEVATION(FEET) =   1240.00
  DOWNSTREAM ELEVATION(FEET) =   1230.00
  ELEVATION DIFFERENCE(FEET) =     10.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.909
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.630
  SUBAREA RUNOFF(CFS) =      0.58
  TOTAL AREA(ACRES) =      0.25   TOTAL RUNOFF(CFS) =      0.58

************************************************************************
  FLOW PROCESS FROM NODE    958.00 TO NODE    959.00 IS CODE =  53
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1230.00  DOWNSTREAM(FEET) =    980.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1125.00   CHANNEL SLOPE =  0.2222
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1707 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.58
  FLOW VELOCITY(FEET/SEC) =   2.31 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   8.10   Tc(MIN.) =   15.01
  LONGEST FLOWPATH FROM NODE    957.00 TO NODE    959.00 =    1259.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    958.00 TO NODE    959.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.019
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =   10.43   SUBAREA RUNOFF(CFS) =   14.67
 TOTAL AREA(ACRES) =       10.7   TOTAL RUNOFF(CFS) =      15.02
 TC(MIN.) =   15.01

****************************************************************************
 FLOW PROCESS FROM NODE    959.00 TO NODE    955.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   994.00  DOWNSTREAM(FEET) =   908.00
 FLOW LENGTH(FEET) =  1637.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  14.09
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      15.02
 PIPE TRAVEL TIME(MIN.) =   1.94    Tc(MIN.) =   16.95
 LONGEST FLOWPATH FROM NODE    957.00 TO NODE    955.00 =    2896.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    955.00 TO NODE    955.00 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.) =   16.95
 RAINFALL INTENSITY(INCH/HR) =   3.72
 TOTAL STREAM AREA(ACRES) =    10.68
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     15.02

****************************************************************************
 FLOW PROCESS FROM NODE    950.00 TO NODE    951.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =   1860.00
 DOWNSTREAM ELEVATION(FEET) =   1850.00
 ELEVATION DIFFERENCE(FEET) =     10.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
 WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.061
```



```
 SUBAREA RUNOFF(CFS) =      0.84
 TOTAL AREA(ACRES) =      0.34   TOTAL RUNOFF(CFS) =      0.84

****************************************************************************
 FLOW PROCESS FROM NODE    951.00 TO NODE    952.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1850.00  DOWNSTREAM(FEET) =   1390.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1137.00   CHANNEL SLOPE =  0.4046
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .2145 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.84
 FLOW VELOCITY(FEET/SEC) =   2.59 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   7.31   Tc(MIN.) =   13.57
 LONGEST FLOWPATH FROM NODE    950.00 TO NODE    952.00 =    1237.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    951.00 TO NODE    952.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.289
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =   18.34   SUBAREA RUNOFF(CFS) =   27.53
 TOTAL AREA(ACRES) =       18.7   TOTAL RUNOFF(CFS) =      28.04
 TC(MIN.) =   13.57

****************************************************************************
 FLOW PROCESS FROM NODE    952.00 TO NODE    953.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1390.00  DOWNSTREAM(FEET) =   1040.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1715.00   CHANNEL SLOPE =  0.2041
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =      28.04
 FLOW VELOCITY(FEET/SEC) =  10.39 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.75   Tc(MIN.) =   16.32
 LONGEST FLOWPATH FROM NODE    950.00 TO NODE    953.00 =    2952.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    952.00 TO NODE    953.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.808
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   96.51   SUBAREA RUNOFF(CFS) =  128.63
  TOTAL AREA(ACRES) =      115.2   TOTAL RUNOFF(CFS) =     153.52
  TC(MIN.) =   16.32

****************************************************************************
  FLOW PROCESS FROM NODE    953.00 TO NODE    954.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1040.00  DOWNSTREAM(FEET) =    880.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  2170.00   CHANNEL SLOPE =  0.0737
  CHANNEL FLOW THRU SUBAREA(CFS) =     153.52
  FLOW VELOCITY(FEET/SEC) =  14.68 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   2.46   Tc(MIN.) =   18.79
  LONGEST FLOWPATH FROM NODE    950.00 TO NODE    954.00 =    5122.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    953.00 TO NODE    954.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.478
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   73.58   SUBAREA RUNOFF(CFS) =   89.56
  TOTAL AREA(ACRES) =      188.8   TOTAL RUNOFF(CFS) =     229.78
  TC(MIN.) =   18.79

****************************************************************************
  FLOW PROCESS FROM NODE    954.00 TO NODE    955.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   874.00  DOWNSTREAM(FEET) =   873.00
  FLOW LENGTH(FEET) =   113.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  47.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.85
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     229.78
  PIPE TRAVEL TIME(MIN.) =   0.14    Tc(MIN.) =   18.92
  LONGEST FLOWPATH FROM NODE    950.00 TO NODE    955.00 =    5235.00 FEET.
```



```
****************************************************************************
  FLOW PROCESS FROM NODE    955.00 TO NODE    955.00 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.) =   18.92
  RAINFALL INTENSITY(INCH/HR) =   3.46
  TOTAL STREAM AREA(ACRES) =   188.77
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    229.78

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       15.02    16.95        3.717         10.68
      2      229.78    18.92        3.462        188.77

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      220.83    16.95       3.717
      2      243.77    18.92       3.462

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     243.77   Tc(MIN.) =   18.92
  TOTAL AREA(ACRES) =      199.5
  LONGEST FLOWPATH FROM NODE    950.00 TO NODE    955.00 =    5235.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    955.00 TO NODE    960.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   908.00  DOWNSTREAM(FEET) =   905.00
  FLOW LENGTH(FEET) =   204.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  57.0 INCH PIPE IS  42.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.16
  ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     243.77
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =   19.12
  LONGEST FLOWPATH FROM NODE    950.00 TO NODE    960.00 =    5439.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    960.00 TO NODE    960.00 IS CODE =   1
```

```
------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   19.12
  RAINFALL INTENSITY(INCH/HR) =   3.44
  TOTAL STREAM AREA(ACRES) =   199.45
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    243.77

************************************************************************
  FLOW PROCESS FROM NODE    962.00 TO NODE    963.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =   1240.00
  DOWNSTREAM ELEVATION(FEET) =   1230.00
  ELEVATION DIFFERENCE(FEET) =     10.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.061
  SUBAREA RUNOFF(CFS) =      0.69
  TOTAL AREA(ACRES) =      0.28   TOTAL RUNOFF(CFS) =      0.69

************************************************************************
  FLOW PROCESS FROM NODE    963.00 TO NODE    964.00 IS CODE =  52
------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1230.00  DOWNSTREAM(FEET) =    890.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1033.00   CHANNEL SLOPE =  0.3291
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.69
  FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.63   Tc(MIN.) =    9.90
  LONGEST FLOWPATH FROM NODE    962.00 TO NODE    964.00 =    1133.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    963.00 TO NODE    964.00 IS CODE =  81
------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.258
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
```



```
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    9.84   SUBAREA RUNOFF(CFS) =   18.11
  TOTAL AREA(ACRES) =       10.1   TOTAL RUNOFF(CFS) =      18.63
  TC(MIN.) =    9.90

************************************************************************
  FLOW PROCESS FROM NODE    964.00 TO NODE    960.00 IS CODE =  31
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   890.00  DOWNSTREAM(FEET) =   885.00
  FLOW LENGTH(FEET) =   210.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.96
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      18.63
  PIPE TRAVEL TIME(MIN.) =   0.32    Tc(MIN.) =   10.22
  LONGEST FLOWPATH FROM NODE    962.00 TO NODE    960.00 =    1343.00 FEET.

************************************************************************
  FLOW PROCESS FROM NODE    960.00 TO NODE    960.00 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.) =   10.22
  RAINFALL INTENSITY(INCH/HR) =   5.15
  TOTAL STREAM AREA(ACRES) =    10.12
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     18.63

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      243.77    19.12        3.438        199.45
      2       18.63    10.22        5.152         10.12

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      181.33    10.22       5.152
      2      256.20    19.12       3.438

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     256.20   Tc(MIN.) =   19.12
```

```
 TOTAL AREA(ACRES) =      209.6
 LONGEST FLOWPATH FROM NODE    950.00 TO NODE    960.00 =    5439.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    960.00 TO NODE    965.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   905.00  DOWNSTREAM(FEET) =   870.00
 FLOW LENGTH(FEET) =   947.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  48.0 INCH PIPE IS  37.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  24.38
 ESTIMATED PIPE DIAMETER(INCH) =  48.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     256.20
 PIPE TRAVEL TIME(MIN.) =   0.65    Tc(MIN.) =   19.77
 LONGEST FLOWPATH FROM NODE    950.00 TO NODE    965.00 =    6386.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    965.00 TO NODE    970.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    870.00  DOWNSTREAM(FEET) =    770.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   600.00   CHANNEL SLOPE =  0.1667
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =     256.20
 FLOW VELOCITY(FEET/SEC) =  20.03 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   0.50   Tc(MIN.) =   20.27
 LONGEST FLOWPATH FROM NODE    950.00 TO NODE    970.00 =    6986.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    970.00 TO NODE    970.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   20.27
 RAINFALL INTENSITY(INCH/HR) =   3.31
 TOTAL STREAM AREA(ACRES) =   209.57
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    256.20

****************************************************************************
 FLOW PROCESS FROM NODE    967.00 TO NODE    968.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
```



```
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =   1670.00
 DOWNSTREAM ELEVATION(FEET) =   1660.00
 ELEVATION DIFFERENCE(FEET) =     10.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
 WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.061
 SUBAREA RUNOFF(CFS) =      1.75
 TOTAL AREA(ACRES) =      0.71   TOTAL RUNOFF(CFS) =      1.75

****************************************************************************
 FLOW PROCESS FROM NODE    968.00 TO NODE    969.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1660.00  DOWNSTREAM(FEET) =    950.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  4084.00   CHANNEL SLOPE =  0.1738
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       1.75
 FLOW VELOCITY(FEET/SEC) =   5.30 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =  12.85   Tc(MIN.) =   19.12
 LONGEST FLOWPATH FROM NODE    967.00 TO NODE    969.00 =    4184.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    968.00 TO NODE    969.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.439
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =  199.47   SUBAREA RUNOFF(CFS) =  240.09
 TOTAL AREA(ACRES) =      200.2   TOTAL RUNOFF(CFS) =     240.94
 TC(MIN.) =   19.12

****************************************************************************
 FLOW PROCESS FROM NODE    969.00 TO NODE    970.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    950.00  DOWNSTREAM(FEET) =    770.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  3275.00   CHANNEL SLOPE =  0.0550
 CHANNEL FLOW THRU SUBAREA(CFS) =     240.94
 FLOW VELOCITY(FEET/SEC) =  14.57 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   3.75   Tc(MIN.) =   22.86
 LONGEST FLOWPATH FROM NODE    967.00 TO NODE    970.00 =    7459.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    969.00 TO NODE    970.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.064
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =  270.00   SUBAREA RUNOFF(CFS) =  289.55
  TOTAL AREA(ACRES) =      470.2   TOTAL RUNOFF(CFS) =     504.23
  TC(MIN.) =   22.86

****************************************************************************
  FLOW PROCESS FROM NODE    970.00 TO NODE    970.00 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.) =   22.86
  RAINFALL INTENSITY(INCH/HR) =   3.06
  TOTAL STREAM AREA(ACRES) =   470.18
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    504.23

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      256.20    20.27        3.312        209.57
      2      504.23    22.86        3.064        470.18

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      703.18    20.27       3.312
      2      741.27    22.86       3.064

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     741.27   Tc(MIN.) =   22.86
  TOTAL AREA(ACRES) =      679.8
  LONGEST FLOWPATH FROM NODE    967.00 TO NODE    970.00 =    7459.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    970.00 TO NODE    971.00 IS CODE =  52
----------------------------------------------------------------------------
```



```
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    770.00  DOWNSTREAM(FEET) =    630.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  3900.00   CHANNEL SLOPE =  0.0359
  CHANNEL FLOW THRU SUBAREA(CFS) =     741.27
  FLOW VELOCITY(FEET/SEC) =  16.84 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.86   Tc(MIN.) =   26.72
  LONGEST FLOWPATH FROM NODE    967.00 TO NODE    971.00 =   11359.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    970.00 TO NODE    971.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.771
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =  154.50   SUBAREA RUNOFF(CFS) =  149.83
  TOTAL AREA(ACRES) =      834.2   TOTAL RUNOFF(CFS) =     809.04
  TC(MIN.) =   26.72

****************************************************************************
  FLOW PROCESS FROM NODE    971.00 TO NODE    972.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   602.00  DOWNSTREAM(FEET) =   596.00
  FLOW LENGTH(FEET) =   186.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  75.0 INCH PIPE IS  60.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  30.71
  ESTIMATED PIPE DIAMETER(INCH) =  75.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     809.04
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =   26.82
  LONGEST FLOWPATH FROM NODE    967.00 TO NODE    972.00 =   11545.00 FEET.

+----------------------------------------------------------------------------+
| END ESAT SIDE BYPASS (SOUTH WATERTANK TO NORTH BASIN 2 CULVERT)            |
| BEGIN BASIN 1 SOUTH HYD                                                    |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    301.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
```

```
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    50.00
 UPSTREAM ELEVATION(FEET) =    698.00
 DOWNSTREAM ELEVATION(FEET) =    696.00
 ELEVATION DIFFERENCE(FEET) =      2.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.005
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.168
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      1.04
 TOTAL AREA(ACRES) =      0.15   TOTAL RUNOFF(CFS) =      1.04

****************************************************************************
 FLOW PROCESS FROM NODE    301.00 TO NODE    302.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  3 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  696.00  DOWNSTREAM ELEVATION(FEET) =  654.00
 STREET LENGTH(FEET) =  1090.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.83
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.33
   HALFSTREET FLOOD WIDTH(FEET) =    9.97
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.42
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.44
 STREET FLOW TRAVEL TIME(MIN.) =   4.11   Tc(MIN.) =    6.11
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.173
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.850
 SUBAREA AREA(ACRES) =    2.85      SUBAREA RUNOFF(CFS) =   17.38
 TOTAL AREA(ACRES) =        3.0        PEAK FLOW RATE(CFS) =      18.29

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  12.93
 FLOW VELOCITY(FEET/SEC.) =  5.11   DEPTH*VELOCITY(FT*FT/SEC.) =   1.97
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    302.00 =    1140.00 FEET.
```



```
****************************************************************************
 FLOW PROCESS FROM NODE    302.00 TO NODE    309.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   654.00  DOWNSTREAM(FEET) =   653.00
 FLOW LENGTH(FEET) =    45.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.62
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      18.29
 PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =    6.19
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    309.00 =    1185.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    309.00 TO NODE    309.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

+--------------------------------------------------------------------------+
| 400 SERIES                                                               |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
 FLOW PROCESS FROM NODE    400.00 TO NODE    401.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6200
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
 UPSTREAM ELEVATION(FEET) =   1000.50
 DOWNSTREAM ELEVATION(FEET) =    999.35
 ELEVATION DIFFERENCE(FEET) =      1.15
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.126
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.165
 SUBAREA RUNOFF(CFS) =      0.89
 TOTAL AREA(ACRES) =      0.20   TOTAL RUNOFF(CFS) =      0.89

****************************************************************************
 FLOW PROCESS FROM NODE    401.00 TO NODE    402.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  9 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  997.00  DOWNSTREAM ELEVATION(FEET) =  946.50
```

```
  STREET LENGTH(FEET) =   709.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.63
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    8.68
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.53
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.66
  STREET FLOW TRAVEL TIME(MIN.) =   2.14   Tc(MIN.) =    8.26
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.907
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.620
  SUBAREA AREA(ACRES) =    4.74      SUBAREA RUNOFF(CFS) =   17.36
  TOTAL AREA(ACRES) =        4.9        PEAK FLOW RATE(CFS) =      18.09

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  11.36
  FLOW VELOCITY(FEET/SEC.) =  6.43   DEPTH*VELOCITY(FT*FT/SEC.) =   2.27
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    402.00 =     779.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    407.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   941.50  DOWNSTREAM(FEET) =   916.00
  FLOW LENGTH(FEET) =   628.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.16
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      18.09
  PIPE TRAVEL TIME(MIN.) =   0.80    Tc(MIN.) =    9.06
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    407.00 =    1407.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    402.00 TO NODE    407.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```



```
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.567
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6200
  SUBAREA AREA(ACRES) =    3.41   SUBAREA RUNOFF(CFS) =   11.77
  TOTAL AREA(ACRES) =        8.3   TOTAL RUNOFF(CFS) =      28.82
  TC(MIN.) =    9.06

****************************************************************************
  FLOW PROCESS FROM NODE    407.00 TO NODE    412.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   911.00  DOWNSTREAM(FEET) =   866.50
  FLOW LENGTH(FEET) =  1241.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  16.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.86
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      28.82
  PIPE TRAVEL TIME(MIN.) =   1.49    Tc(MIN.) =   10.55
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    412.00 =    2648.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    407.00 TO NODE    412.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.046
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6200
  SUBAREA AREA(ACRES) =    6.82   SUBAREA RUNOFF(CFS) =   21.34
  TOTAL AREA(ACRES) =       15.2   TOTAL RUNOFF(CFS) =      47.46
  TC(MIN.) =   10.55

****************************************************************************
  FLOW PROCESS FROM NODE    412.00 TO NODE    422.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   866.00  DOWNSTREAM(FEET) =   859.00
  FLOW LENGTH(FEET) =   701.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  25.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.84
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      47.46
```

```
  PIPE TRAVEL TIME(MIN.) =   1.19    Tc(MIN.) =   11.74
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    422.00 =    3349.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    412.00 TO NODE    422.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.710
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6200
  SUBAREA AREA(ACRES) =    4.20   SUBAREA RUNOFF(CFS) =   12.27
  TOTAL AREA(ACRES) =       19.4   TOTAL RUNOFF(CFS) =      56.57
  TC(MIN.) =   11.74

****************************************************************************
  FLOW PROCESS FROM NODE    422.00 TO NODE    427.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   859.00  DOWNSTREAM(FEET) =   739.00
  FLOW LENGTH(FEET) =   986.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  15.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  26.77
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      56.57
  PIPE TRAVEL TIME(MIN.) =   0.61    Tc(MIN.) =   12.35
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    427.00 =    4335.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    422.00 TO NODE    427.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.558
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6200
  SUBAREA AREA(ACRES) =    5.51   SUBAREA RUNOFF(CFS) =   15.57
  TOTAL AREA(ACRES) =       24.9   TOTAL RUNOFF(CFS) =      70.31
  TC(MIN.) =   12.35

****************************************************************************
  FLOW PROCESS FROM NODE    427.00 TO NODE    428.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```



```
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   740.00  DOWNSTREAM(FEET) =   724.00
  FLOW LENGTH(FEET) =   251.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.75
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      70.31
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   12.54
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    428.00 =    4586.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    428.00 TO NODE    428.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    440.00 TO NODE    441.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6200
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   300.00
  UPSTREAM ELEVATION(FEET) =    997.00
  DOWNSTREAM ELEVATION(FEET) =    975.00
  ELEVATION DIFFERENCE(FEET) =     22.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.447
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.168
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      1.22
  TOTAL AREA(ACRES) =      0.24   TOTAL RUNOFF(CFS) =      1.22

****************************************************************************
  FLOW PROCESS FROM NODE    441.00 TO NODE    442.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  9 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  975.00  DOWNSTREAM ELEVATION(FEET) =  931.50
  STREET LENGTH(FEET) =   611.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020
```

```
  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      12.80
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =    9.81
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.93
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.91
  STREET FLOW TRAVEL TIME(MIN.) =   1.72   Tc(MIN.) =    6.17
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.135
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.620
  SUBAREA AREA(ACRES) =    5.21      SUBAREA RUNOFF(CFS) =   23.05
  TOTAL AREA(ACRES) =        5.4        PEAK FLOW RATE(CFS) =      24.11

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.38   HALFSTREET FLOOD WIDTH(FEET) =  12.76
  FLOW VELOCITY(FEET/SEC.) =  6.90   DEPTH*VELOCITY(FT*FT/SEC.) =   2.63
  LONGEST FLOWPATH FROM NODE    440.00 TO NODE    442.00 =     911.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    442.00 TO NODE    447.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   926.00  DOWNSTREAM(FEET) =   883.00
  FLOW LENGTH(FEET) =   612.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.35
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      24.11
  PIPE TRAVEL TIME(MIN.) =   0.59    Tc(MIN.) =    6.75
  LONGEST FLOWPATH FROM NODE    440.00 TO NODE    447.00 =    1523.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    442.00 TO NODE    447.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.728
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6200
```



```
  SUBAREA AREA(ACRES) =    4.73   SUBAREA RUNOFF(CFS) =   19.73
  TOTAL AREA(ACRES) =       10.2   TOTAL RUNOFF(CFS) =      42.46
  TC(MIN.) =    6.75

****************************************************************************
  FLOW PROCESS FROM NODE    447.00 TO NODE    452.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   883.00  DOWNSTREAM(FEET) =   877.50
  FLOW LENGTH(FEET) =   507.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  33.0 INCH PIPE IS  22.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.02
  ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      42.46
  PIPE TRAVEL TIME(MIN.) =   0.84    Tc(MIN.) =    7.60
  LONGEST FLOWPATH FROM NODE    440.00 TO NODE    452.00 =    2030.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    447.00 TO NODE    452.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.236
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6200
  SUBAREA AREA(ACRES) =    3.54   SUBAREA RUNOFF(CFS) =   13.69
  TOTAL AREA(ACRES) =       13.7   TOTAL RUNOFF(CFS) =      53.05
  TC(MIN.) =    7.60

****************************************************************************
  FLOW PROCESS FROM NODE    452.00 TO NODE    457.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   877.50  DOWNSTREAM(FEET) =   875.00
  FLOW LENGTH(FEET) =   253.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  24.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.20
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      53.05
  PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =    8.01
  LONGEST FLOWPATH FROM NODE    440.00 TO NODE    457.00 =    2283.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    452.00 TO NODE    457.00 IS CODE =  81
----------------------------------------------------------------------------
```

```
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.027
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6200
  SUBAREA AREA(ACRES) =    2.94   SUBAREA RUNOFF(CFS) =   10.99
  TOTAL AREA(ACRES) =       16.7   TOTAL RUNOFF(CFS) =      62.25
  TC(MIN.) =    8.01

****************************************************************************
  FLOW PROCESS FROM NODE    457.00 TO NODE    462.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   875.00  DOWNSTREAM(FEET) =   871.50
  FLOW LENGTH(FEET) =   294.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  26.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.32
  ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      62.25
  PIPE TRAVEL TIME(MIN.) =   0.43    Tc(MIN.) =    8.44
  LONGEST FLOWPATH FROM NODE    440.00 TO NODE    462.00 =    2577.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    462.00 TO NODE    462.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    8.44
  RAINFALL INTENSITY(INCH/HR) =   5.83
  TOTAL STREAM AREA(ACRES) =    16.66
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     62.25

****************************************************************************
  FLOW PROCESS FROM NODE    460.00 TO NODE    461.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6200
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    900.00
  DOWNSTREAM ELEVATION(FEET) =    890.00
  ELEVATION DIFFERENCE(FEET) =     10.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.011
```



```
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.168
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      1.42
  TOTAL AREA(ACRES) =      0.28   TOTAL RUNOFF(CFS) =      1.42

****************************************************************************
  FLOW PROCESS FROM NODE    461.00 TO NODE    462.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  9 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  888.00  DOWNSTREAM ELEVATION(FEET) =  876.50
  STREET LENGTH(FEET) =   961.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.64
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.43
    HALFSTREET FLOOD WIDTH(FEET) =   15.22
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.14
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.35
  STREET FLOW TRAVEL TIME(MIN.) =   5.10   Tc(MIN.) =    9.12
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.545
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.620
  SUBAREA AREA(ACRES) =    3.53      SUBAREA RUNOFF(CFS) =   12.14
  TOTAL AREA(ACRES) =        3.8        PEAK FLOW RATE(CFS) =      13.10

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.49   HALFSTREET FLOOD WIDTH(FEET) =  18.00
  FLOW VELOCITY(FEET/SEC.) =  3.47   DEPTH*VELOCITY(FT*FT/SEC.) =   1.69
  LONGEST FLOWPATH FROM NODE    460.00 TO NODE    462.00 =    1061.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    462.00 TO NODE    462.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
```

```
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    9.12
 RAINFALL INTENSITY(INCH/HR) =   5.54
 TOTAL STREAM AREA(ACRES) =     3.81
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     13.10

****************************************************************************
 FLOW PROCESS FROM NODE    458.00 TO NODE    459.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6200
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   130.00
 UPSTREAM ELEVATION(FEET) =    900.00
 DOWNSTREAM ELEVATION(FEET) =    883.00
 ELEVATION DIFFERENCE(FEET) =     17.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.011
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.168
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      1.77
 TOTAL AREA(ACRES) =      0.35   TOTAL RUNOFF(CFS) =      1.77

****************************************************************************
 FLOW PROCESS FROM NODE    459.00 TO NODE    462.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  9 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  883.00  DOWNSTREAM ELEVATION(FEET) =  876.50
 STREET LENGTH(FEET) =   413.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 18.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

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

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.84
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.43
   HALFSTREET FLOOD WIDTH(FEET) =   15.29
```



```
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.60
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.56
 STREET FLOW TRAVEL TIME(MIN.) =   1.91   Tc(MIN.) =    5.92
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.322
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6200
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.620
 SUBAREA AREA(ACRES) =    3.10      SUBAREA RUNOFF(CFS) =   14.07
 TOTAL AREA(ACRES) =        3.4        PEAK FLOW RATE(CFS) =      15.66

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.49   HALFSTREET FLOOD WIDTH(FEET) =  18.00
 FLOW VELOCITY(FEET/SEC.) =  3.98   DEPTH*VELOCITY(FT*FT/SEC.) =   1.94
 LONGEST FLOWPATH FROM NODE    458.00 TO NODE    462.00 =     543.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    462.00 TO NODE    462.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
 TIME OF CONCENTRATION(MIN.) =    5.92
 RAINFALL INTENSITY(INCH/HR) =   7.32
 TOTAL STREAM AREA(ACRES) =     3.45
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     15.66

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       62.25     8.44        5.826         16.66
     2       13.10     9.12        5.545          3.81
     3       15.66     5.92        7.322          3.45

 RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
 CONFLUENCE FORMULA USED FOR  3 STREAMS.

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       67.84     5.92       7.322
     2       86.84     8.44       5.826
     3       84.21     9.12       5.545

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      86.84   Tc(MIN.) =    8.44
 TOTAL AREA(ACRES) =       23.9
 LONGEST FLOWPATH FROM NODE    440.00 TO NODE    462.00 =    2577.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    462.00 TO NODE    467.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   870.00  DOWNSTREAM(FEET) =   865.00
  FLOW LENGTH(FEET) =   368.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  39.0 INCH PIPE IS  29.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.84
  ESTIMATED PIPE DIAMETER(INCH) =  39.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      86.84
  PIPE TRAVEL TIME(MIN.) =   0.48    Tc(MIN.) =    8.92
  LONGEST FLOWPATH FROM NODE    440.00 TO NODE    467.00 =    2945.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    467.00 TO NODE    467.00 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.) =    8.92
  RAINFALL INTENSITY(INCH/HR) =   5.62
  TOTAL STREAM AREA(ACRES) =    23.92
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     86.84

****************************************************************************
  FLOW PROCESS FROM NODE    465.00 TO NODE    466.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .7000
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   125.00
  UPSTREAM ELEVATION(FEET) =    896.50
  DOWNSTREAM ELEVATION(FEET) =    894.00
  ELEVATION DIFFERENCE(FEET) =      2.50
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.269
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    85.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.896
  SUBAREA RUNOFF(CFS) =      1.38
  TOTAL AREA(ACRES) =      0.25   TOTAL RUNOFF(CFS) =      1.38

****************************************************************************
  FLOW PROCESS FROM NODE    466.00 TO NODE    467.00 IS CODE =  62
----------------------------------------------------------------------------
```



```
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  9 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  894.00  DOWNSTREAM ELEVATION(FEET) =  888.00
  STREET LENGTH(FEET) =   450.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 18.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =   9.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       7.66
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.35
    HALFSTREET FLOOD WIDTH(FEET) =   11.29
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.75
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.97
  STREET FLOW TRAVEL TIME(MIN.) =   2.72   Tc(MIN.) =    7.99
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.035
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .7000
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.700
  SUBAREA AREA(ACRES) =    2.94      SUBAREA RUNOFF(CFS) =   12.42
  TOTAL AREA(ACRES) =        3.2        PEAK FLOW RATE(CFS) =      13.48

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.41   HALFSTREET FLOOD WIDTH(FEET) =  14.17
  FLOW VELOCITY(FEET/SEC.) =  3.17   DEPTH*VELOCITY(FT*FT/SEC.) =   1.30
  LONGEST FLOWPATH FROM NODE    465.00 TO NODE    467.00 =     575.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    467.00 TO NODE    467.00 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) =   6.03
  TOTAL STREAM AREA(ACRES) =     3.19
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     13.48

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
```

```
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       86.84     8.92        5.622         23.92
      2       13.48     7.99        6.035          3.19

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       94.38     7.99       6.035
      2       99.40     8.92       5.622

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      99.40   Tc(MIN.) =    8.92
  TOTAL AREA(ACRES) =       27.1
  LONGEST FLOWPATH FROM NODE    440.00 TO NODE    467.00 =    2945.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    467.00 TO NODE    472.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   888.00  DOWNSTREAM(FEET) =   805.00
  FLOW LENGTH(FEET) =   770.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  19.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  29.40
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      99.40
  PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =    9.36
  LONGEST FLOWPATH FROM NODE    440.00 TO NODE    472.00 =    3715.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    467.00 TO NODE    472.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.452
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6329
  SUBAREA AREA(ACRES) =    5.54   SUBAREA RUNOFF(CFS) =   19.63
  TOTAL AREA(ACRES) =       32.6   TOTAL RUNOFF(CFS) =     112.66
  TC(MIN.) =    9.36

****************************************************************************
  FLOW PROCESS FROM NODE    472.00 TO NODE    476.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```



```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   805.00  DOWNSTREAM(FEET) =   751.00
  FLOW LENGTH(FEET) =   395.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  30.0 INCH PIPE IS  19.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  33.15
  ESTIMATED PIPE DIAMETER(INCH) =  30.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     112.66
  PIPE TRAVEL TIME(MIN.) =   0.20    Tc(MIN.) =    9.56
  LONGEST FLOWPATH FROM NODE    440.00 TO NODE    476.00 =    4110.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    476.00 TO NODE    476.00 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) =   5.38
  TOTAL STREAM AREA(ACRES) =    32.65
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    112.66

****************************************************************************
  FLOW PROCESS FROM NODE    473.00 TO NODE    474.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   140.00
  UPSTREAM ELEVATION(FEET) =    895.00
  DOWNSTREAM ELEVATION(FEET) =    860.00
  ELEVATION DIFFERENCE(FEET) =     35.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.061
  SUBAREA RUNOFF(CFS) =      0.52
  TOTAL AREA(ACRES) =      0.21   TOTAL RUNOFF(CFS) =      0.52

****************************************************************************
  FLOW PROCESS FROM NODE    474.00 TO NODE    475.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    860.00  DOWNSTREAM(FEET) =    760.00
```

```
 CHANNEL LENGTH THRU SUBAREA(FEET) =   773.00   CHANNEL SLOPE =  0.1294
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.52
 FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.72   Tc(MIN.) =    8.98
 LONGEST FLOWPATH FROM NODE    473.00 TO NODE    475.00 =     913.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    474.00 TO NODE    475.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.597
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =    2.30   SUBAREA RUNOFF(CFS) =    4.51
 TOTAL AREA(ACRES) =        2.5   TOTAL RUNOFF(CFS) =       4.92
 TC(MIN.) =    8.98

****************************************************************************
 FLOW PROCESS FROM NODE    475.00 TO NODE    476.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   760.00  DOWNSTREAM(FEET) =   751.00
 FLOW LENGTH(FEET) =   158.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  10.81
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       4.92
 PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =    9.23
 LONGEST FLOWPATH FROM NODE    473.00 TO NODE    476.00 =    1071.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    476.00 TO NODE    476.00 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.) =    9.23
 RAINFALL INTENSITY(INCH/HR) =   5.50
 TOTAL STREAM AREA(ACRES) =     2.51
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      4.92
```



```
 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1      112.66     9.56        5.378         32.65
     2        4.92     9.23        5.502          2.51

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1      115.05     9.23       5.502
     2      117.46     9.56       5.378

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     117.46   Tc(MIN.) =    9.56
 TOTAL AREA(ACRES) =       35.2
 LONGEST FLOWPATH FROM NODE    440.00 TO NODE    476.00 =    4110.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    476.00 TO NODE    479.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   751.00  DOWNSTREAM(FEET) =   730.00
 FLOW LENGTH(FEET) =   285.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  33.0 INCH PIPE IS  23.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  26.39
 ESTIMATED PIPE DIAMETER(INCH) =  33.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     117.46
 PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =    9.74
 LONGEST FLOWPATH FROM NODE    440.00 TO NODE    479.00 =    4395.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    476.00 TO NODE    479.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.314
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.6178
 SUBAREA AREA(ACRES) =    5.62   SUBAREA RUNOFF(CFS) =   19.41
 TOTAL AREA(ACRES) =       40.8   TOTAL RUNOFF(CFS) =     133.89
 TC(MIN.) =    9.74

****************************************************************************
 FLOW PROCESS FROM NODE    479.00 TO NODE    428.00 IS CODE =  31
```

```
------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   730.00  DOWNSTREAM(FEET) =   729.00
  FLOW LENGTH(FEET) =    51.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  33.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.27
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     133.89
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =    9.79
  LONGEST FLOWPATH FROM NODE    440.00 TO NODE    428.00 =    4446.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    428.00 TO NODE    428.00 IS CODE =  11
----------------------------------------------------------------------------
  >>>>>CONFLUENCE MEMORY BANK # 2 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

  ** MAIN STREAM CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1      133.89     9.79       5.296       40.78
  LONGEST FLOWPATH FROM NODE    440.00 TO NODE    428.00 =    4446.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       70.31    12.54       4.513       24.88
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    428.00 =    4586.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1     188.75       9.79        5.296
      2     184.40      12.54        4.513

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     188.75   Tc(MIN.) =    9.79
  TOTAL AREA(ACRES) =       65.7

****************************************************************************
  FLOW PROCESS FROM NODE    428.00 TO NODE    428.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    428.00 TO NODE    316.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```



```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   729.00  DOWNSTREAM(FEET) =   709.00
  FLOW LENGTH(FEET) =   666.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  34.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  20.99
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     188.75
  PIPE TRAVEL TIME(MIN.) =   0.53    Tc(MIN.) =   10.32
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    316.00 =    5252.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    428.00 TO NODE    316.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.119
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6211
  SUBAREA AREA(ACRES) =    5.65   SUBAREA RUNOFF(CFS) =   18.80
  TOTAL AREA(ACRES) =       71.3   TOTAL RUNOFF(CFS) =     226.74
  TC(MIN.) =   10.32

****************************************************************************
  FLOW PROCESS FROM NODE    316.00 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) =   707.50  DOWNSTREAM(FEET) =   650.00
  FLOW LENGTH(FEET) =  1124.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  31.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  27.10
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     226.74
  PIPE TRAVEL TIME(MIN.) =   0.69    Tc(MIN.) =   11.01
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    314.00 =    6376.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    316.00 TO NODE    314.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.909
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .6500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6235
  SUBAREA AREA(ACRES) =    6.20   SUBAREA RUNOFF(CFS) =   19.78
```

```
 TOTAL AREA(ACRES) =       77.5   TOTAL RUNOFF(CFS) =     237.24
 TC(MIN.) =   11.01

****************************************************************************
 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.) =   11.01
 RAINFALL INTENSITY(INCH/HR) =   4.91
 TOTAL STREAM AREA(ACRES) =    77.51
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    237.24

****************************************************************************
 FLOW PROCESS FROM NODE    311.00 TO NODE    312.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    690.00
 DOWNSTREAM ELEVATION(FEET) =    680.00
 ELEVATION DIFFERENCE(FEET) =     10.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
 WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.061
 SUBAREA RUNOFF(CFS) =      0.62
 TOTAL AREA(ACRES) =      0.25   TOTAL RUNOFF(CFS) =      0.62

****************************************************************************
 FLOW PROCESS FROM NODE    312.00 TO NODE    313.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   680.00  DOWNSTREAM(FEET) =   660.00
 FLOW LENGTH(FEET) =   722.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   2.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.56
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       0.62
 PIPE TRAVEL TIME(MIN.) =   2.64    Tc(MIN.) =    8.90
 LONGEST FLOWPATH FROM NODE    311.00 TO NODE    313.00 =     822.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    312.00 TO NODE    313.00 IS CODE =  81
```



```
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.629
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =    2.85   SUBAREA RUNOFF(CFS) =    5.62
 TOTAL AREA(ACRES) =        3.1   TOTAL RUNOFF(CFS) =       6.11
 TC(MIN.) =    8.90

****************************************************************************
 FLOW PROCESS FROM NODE    313.00 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) =   660.00  DOWNSTREAM(FEET) =   650.00
 FLOW LENGTH(FEET) =   193.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   6.3 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.11
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       6.11
 PIPE TRAVEL TIME(MIN.) =   0.29    Tc(MIN.) =    9.19
 LONGEST FLOWPATH FROM NODE    311.00 TO NODE    314.00 =    1015.00 FEET.

****************************************************************************
 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.) =    9.19
 RAINFALL INTENSITY(INCH/HR) =   5.51
 TOTAL STREAM AREA(ACRES) =     3.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.11

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1      237.24    11.01        4.909         77.51
     2        6.11     9.19        5.514          3.10

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

 ** PEAK FLOW RATE TABLE **
```

```
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      204.24     9.19       5.514
      2      242.67    11.01       4.909

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     242.67   Tc(MIN.) =   11.01
  TOTAL AREA(ACRES) =       80.6
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    314.00 =    6376.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    314.00 TO NODE    319.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   650.50  DOWNSTREAM(FEET) =   649.00
  FLOW LENGTH(FEET) =   164.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  60.0 INCH PIPE IS  49.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.09
  ESTIMATED PIPE DIAMETER(INCH) =  60.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     242.67
  PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   11.20
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    319.00 =    6540.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    319.00 TO NODE    319.00 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.) =   11.20
  RAINFALL INTENSITY(INCH/HR) =   4.85
  TOTAL STREAM AREA(ACRES) =    80.61
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    242.67

****************************************************************************
  FLOW PROCESS FROM NODE    321.00 TO NODE    322.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8200
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    690.00
  DOWNSTREAM ELEVATION(FEET) =    680.00
  ELEVATION DIFFERENCE(FEET) =     10.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.340
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
```



```
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.168
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      1.07
  TOTAL AREA(ACRES) =      0.16   TOTAL RUNOFF(CFS) =      1.07

****************************************************************************
  FLOW PROCESS FROM NODE    322.00 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) =   680.00  DOWNSTREAM(FEET) =   651.00
  FLOW LENGTH(FEET) =  1080.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.32
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.07
  PIPE TRAVEL TIME(MIN.) =   3.38    Tc(MIN.) =    5.72
  LONGEST FLOWPATH FROM NODE    321.00 TO NODE    323.00 =    1180.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    322.00 TO NODE    323.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.485
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.8200
  SUBAREA AREA(ACRES) =    7.55   SUBAREA RUNOFF(CFS) =   46.34
  TOTAL AREA(ACRES) =        7.7   TOTAL RUNOFF(CFS) =      47.32
  TC(MIN.) =    5.72

****************************************************************************
  FLOW PROCESS FROM NODE    323.00 TO NODE    319.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   653.00  DOWNSTREAM(FEET) =   649.50
  FLOW LENGTH(FEET) =    75.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  24.0 INCH PIPE IS  19.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.28
  ESTIMATED PIPE DIAMETER(INCH) =  24.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      47.32
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =    5.80
  LONGEST FLOWPATH FROM NODE    321.00 TO NODE    319.00 =    1255.00 FEET.

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

```
 FLOW PROCESS FROM NODE    319.00 TO NODE    319.00 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.) =    5.80
 RAINFALL INTENSITY(INCH/HR) =   7.43
 TOTAL STREAM AREA(ACRES) =     7.71
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     47.32

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1      242.67    11.20        4.854         80.61
     2       47.32     5.80        7.425          7.71

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1      205.98     5.80       7.425
     2      273.61    11.20       4.854

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     273.61   Tc(MIN.) =   11.20
 TOTAL AREA(ACRES) =       88.3
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    319.00 =    6540.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    319.00 TO NODE    324.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   649.50  DOWNSTREAM(FEET) =   649.00
 FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  57.0 INCH PIPE IS  44.7 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  18.36
 ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     273.61
 PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =   11.23
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    324.00 =    6570.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    324.00 TO NODE    324.00 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.) =   11.23
 RAINFALL INTENSITY(INCH/HR) =   4.85
 TOTAL STREAM AREA(ACRES) =    88.32
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    273.61

****************************************************************************
 FLOW PROCESS FROM NODE    326.00 TO NODE    327.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
 UPSTREAM ELEVATION(FEET) =    651.00
 DOWNSTREAM ELEVATION(FEET) =    650.00
 ELEVATION DIFFERENCE(FEET) =      1.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.940
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.168
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.83
 TOTAL AREA(ACRES) =      0.12   TOTAL RUNOFF(CFS) =      0.83

****************************************************************************
 FLOW PROCESS FROM NODE    327.00 TO NODE    328.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  8 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  650.00  DOWNSTREAM ELEVATION(FEET) =  649.00
 STREET LENGTH(FEET) =   121.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.53
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.25
   HALFSTREET FLOOD WIDTH(FEET) =    5.98
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.60
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.39
```

```
 STREET FLOW TRAVEL TIME(MIN.) =   1.26   Tc(MIN.) =    4.20
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.168
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.850
 SUBAREA AREA(ACRES) =    0.20      SUBAREA RUNOFF(CFS) =    1.39
 TOTAL AREA(ACRES) =        0.3        PEAK FLOW RATE(CFS) =       2.22

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   7.24
 FLOW VELOCITY(FEET/SEC.) =  1.73   DEPTH*VELOCITY(FT*FT/SEC.) =   0.47
 LONGEST FLOWPATH FROM NODE    326.00 TO NODE    328.00 =     181.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    328.00 TO NODE    324.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =    4.20
 RAINFALL INTENSITY(INCH/HR) =   8.17
 TOTAL STREAM AREA(ACRES) =     0.32
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.22

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1      273.61    11.23        4.847         88.32
     2        2.22     4.20        8.168          0.32

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1      164.58     4.20       8.168
     2      274.93    11.23       4.847

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     274.93   Tc(MIN.) =   11.23
 TOTAL AREA(ACRES) =       88.6
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    324.00 =    6570.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    324.00 TO NODE    309.00 IS CODE =  31
----------------------------------------------------------------------------
```



```
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   651.00  DOWNSTREAM(FEET) =   650.00
 FLOW LENGTH(FEET) =   102.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  63.0 INCH PIPE IS  49.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  15.06
 ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     274.93
 PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   11.34
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    309.00 =    6672.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    309.00 TO NODE    309.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1      274.93    11.34       4.816       88.64
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    309.00 =    6672.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1       18.29     6.19       7.120        3.00
 LONGEST FLOWPATH FROM NODE    300.00 TO NODE    309.00 =    1185.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc      INTENSITY
 NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1     168.22       6.19       7.120
     2     287.30      11.34       4.816

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     287.30   Tc(MIN.) =   11.34
 TOTAL AREA(ACRES) =       91.6

****************************************************************************
 FLOW PROCESS FROM NODE    309.00 TO NODE    309.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    309.00 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) =   645.00  DOWNSTREAM(FEET) =   638.00
  FLOW LENGTH(FEET) =   552.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  63.0 INCH PIPE IS  46.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.98
  ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     287.30
  PIPE TRAVEL TIME(MIN.) =   0.54    Tc(MIN.) =   11.88
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    335.00 =    7224.00 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.) =   11.88
  RAINFALL INTENSITY(INCH/HR) =   4.67
  TOTAL STREAM AREA(ACRES) =    91.64
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    287.30

****************************************************************************
  FLOW PROCESS FROM NODE    305.00 TO NODE    306.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .5200
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    85.00
  UPSTREAM ELEVATION(FEET) =    662.00
  DOWNSTREAM ELEVATION(FEET) =    659.00
  ELEVATION DIFFERENCE(FEET) =      3.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.322
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.021
  SUBAREA RUNOFF(CFS) =      0.84
  TOTAL AREA(ACRES) =      0.23   TOTAL RUNOFF(CFS) =      0.84

****************************************************************************
  FLOW PROCESS FROM NODE    306.00 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) =   659.00  DOWNSTREAM(FEET) =   644.00
  FLOW LENGTH(FEET) =   935.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   3.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.14
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
```



```
  PIPE-FLOW(CFS) =       0.84
  PIPE TRAVEL TIME(MIN.) =   3.77    Tc(MIN.) =   10.09
  LONGEST FLOWPATH FROM NODE    305.00 TO NODE    335.00 =    1020.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    306.00 TO NODE    335.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.194
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .5200
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5200
  SUBAREA AREA(ACRES) =    2.20   SUBAREA RUNOFF(CFS) =    5.94
  TOTAL AREA(ACRES) =        2.4   TOTAL RUNOFF(CFS) =       6.56
  TC(MIN.) =   10.09

****************************************************************************
  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.) =   10.09
  RAINFALL INTENSITY(INCH/HR) =   5.19
  TOTAL STREAM AREA(ACRES) =     2.43
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      6.56

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      287.30    11.88        4.673         91.64
      2        6.56    10.09        5.194          2.43

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      250.43    10.09       5.194
      2      293.21    11.88       4.673

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     293.21   Tc(MIN.) =   11.88
  TOTAL AREA(ACRES) =       94.1
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    335.00 =    7224.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    335.00 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) =   638.00  DOWNSTREAM(FEET) =   622.00
  FLOW LENGTH(FEET) =  1400.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  63.0 INCH PIPE IS  49.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.25
  ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     293.21
  PIPE TRAVEL TIME(MIN.) =   1.44    Tc(MIN.) =   13.32
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    340.00 =    8624.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 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.) =   13.32
  RAINFALL INTENSITY(INCH/HR) =   4.34
  TOTAL STREAM AREA(ACRES) =    94.07
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    293.21

****************************************************************************
  FLOW PROCESS FROM NODE    342.00 TO NODE    343.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    70.00
  UPSTREAM ELEVATION(FEET) =    650.00
  DOWNSTREAM ELEVATION(FEET) =    648.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.653
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.168
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      2.64
  TOTAL AREA(ACRES) =      0.38   TOTAL RUNOFF(CFS) =      2.64

****************************************************************************
  FLOW PROCESS FROM NODE    343.00 TO NODE    340.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
```



```
  UPSTREAM ELEVATION(FEET) =  650.00  DOWNSTREAM ELEVATION(FEET) =  648.00
  STREET LENGTH(FEET) =  1900.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       8.02
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.51
    HALFSTREET FLOOD WIDTH(FEET) =   19.52
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.06
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.54
  STREET FLOW TRAVEL TIME(MIN.) =  29.77   Tc(MIN.) =   32.42
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.446
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.850
  SUBAREA AREA(ACRES) =    4.45      SUBAREA RUNOFF(CFS) =    9.25
  TOTAL AREA(ACRES) =        4.8        PEAK FLOW RATE(CFS) =      10.04

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.54   HALFSTREET FLOOD WIDTH(FEET) =  21.95
  FLOW VELOCITY(FEET/SEC.) =  1.14   DEPTH*VELOCITY(FT*FT/SEC.) =   0.61
  *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
         AND L = 1900.0 FT WITH ELEVATION-DROP =   2.0 FT, IS   30.9 CFS,
         WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    340.00
  LONGEST FLOWPATH FROM NODE    342.00 TO NODE    340.00 =    1970.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    340.00 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.) =   32.42
  RAINFALL INTENSITY(INCH/HR) =   2.45
  TOTAL STREAM AREA(ACRES) =     4.83
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.04

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
```

```
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      293.21    13.32        4.341         94.07
      2       10.04    32.42        2.446          4.83

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      297.33    13.32       4.341
      2      175.25    32.42       2.446

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     297.33   Tc(MIN.) =   13.32
  TOTAL AREA(ACRES) =       98.9
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    340.00 =    8624.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    345.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   622.50  DOWNSTREAM(FEET) =   602.00
  FLOW LENGTH(FEET) =  1115.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  57.0 INCH PIPE IS  46.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.31
  ESTIMATED PIPE DIAMETER(INCH) =  57.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     297.33
  PIPE TRAVEL TIME(MIN.) =   0.96    Tc(MIN.) =   14.28
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    345.00 =    9739.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    340.00 TO NODE    345.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.150
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6495
  SUBAREA AREA(ACRES) =    1.55   SUBAREA RUNOFF(CFS) =    5.47
  TOTAL AREA(ACRES) =      100.4   TOTAL RUNOFF(CFS) =     297.33
  TC(MIN.) =   14.28
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE    345.00 TO NODE      2.00 IS CODE =  31
----------------------------------------------------------------------------
```



```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   597.00  DOWNSTREAM(FEET) =   579.00
  FLOW LENGTH(FEET) =   223.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  45.0 INCH PIPE IS  33.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  34.25
  ESTIMATED PIPE DIAMETER(INCH) =  45.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     297.33
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =   14.39
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE      2.00 =    9962.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    345.00 TO NODE      2.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.130
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.6393
  SUBAREA AREA(ACRES) =    3.54   SUBAREA RUNOFF(CFS) =    5.12
  TOTAL AREA(ACRES) =      104.0   TOTAL RUNOFF(CFS) =     297.33
  TC(MIN.) =   14.39
  NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      2.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =   14.39
  RAINFALL INTENSITY(INCH/HR) =   4.13
  TOTAL STREAM AREA(ACRES) =   103.99
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    297.33

****************************************************************************
  FLOW PROCESS FROM NODE    354.00 TO NODE    355.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   151.00
  UPSTREAM ELEVATION(FEET) =    607.00
  DOWNSTREAM ELEVATION(FEET) =    604.00
  ELEVATION DIFFERENCE(FEET) =      3.00
```

```
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.296
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    84.80
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.168
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      1.74
  TOTAL AREA(ACRES) =      0.25   TOTAL RUNOFF(CFS) =      1.74

****************************************************************************
  FLOW PROCESS FROM NODE    355.00 TO NODE    359.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  604.00  DOWNSTREAM ELEVATION(FEET) =  595.00
  STREET LENGTH(FEET) =   550.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.56
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.30
    HALFSTREET FLOOD WIDTH(FEET) =    8.57
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.67
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.80
  STREET FLOW TRAVEL TIME(MIN.) =   3.43   Tc(MIN.) =    6.73
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.745
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.850
  SUBAREA AREA(ACRES) =    0.98      SUBAREA RUNOFF(CFS) =    5.62
  TOTAL AREA(ACRES) =        1.2        PEAK FLOW RATE(CFS) =       7.05

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =  10.43
  FLOW VELOCITY(FEET/SEC.) =  2.92   DEPTH*VELOCITY(FT*FT/SEC.) =   0.98
  LONGEST FLOWPATH FROM NODE    354.00 TO NODE    359.00 =     701.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    359.00 TO NODE      2.00 IS CODE =  31
```



```
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   585.00  DOWNSTREAM(FEET) =   579.00
  FLOW LENGTH(FEET) =   223.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.09
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       7.05
  PIPE TRAVEL TIME(MIN.) =   0.41    Tc(MIN.) =    7.14
  LONGEST FLOWPATH FROM NODE    354.00 TO NODE      2.00 =     924.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      2.00 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.) =    7.14
  RAINFALL INTENSITY(INCH/HR) =   6.49
  TOTAL STREAM AREA(ACRES) =     1.23
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.05

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      297.33    14.39        4.130        103.99
      2        7.05     7.14        6.493          1.23

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      196.17     7.14       6.493
      2      301.82    14.39       4.130

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     301.82   Tc(MIN.) =   14.39
  TOTAL AREA(ACRES) =      105.2
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE      2.00 =    9962.00 FEET.

+----------------------------------------------------------------------------+
| APPLY CODE 7 IN BASIN 2 FOR ATTENUATED OUTFLOW                             |
|                                                                            |
|                                                                            |
```

```
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      2.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  29.38   RAIN INTENSITY(INCH/HOUR) =  2.61
  TOTAL AREA(ACRES) =   105.20   TOTAL RUNOFF(CFS) =    175.60

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE    944.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   579.00  DOWNSTREAM(FEET) =   575.00
  FLOW LENGTH(FEET) =   120.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  42.0 INCH PIPE IS  33.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  21.21
  ESTIMATED PIPE DIAMETER(INCH) =  42.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     175.60
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   29.47
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    944.00 =   10082.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    944.00 TO NODE    944.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

+----------------------------------------------------------------------------+
| BEGIN EAST SIDE BYPASS                                                     |
| BASIN 2 TO BASIN 3 SECTION                                                 |
|                                                                            |
+----------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    370.00 TO NODE    371.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   214.00
  UPSTREAM ELEVATION(FEET) =    760.00
  DOWNSTREAM ELEVATION(FEET) =    740.00
  ELEVATION DIFFERENCE(FEET) =     20.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.410
```



```
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.959
  SUBAREA RUNOFF(CFS) =      1.07
  TOTAL AREA(ACRES) =      0.44   TOTAL RUNOFF(CFS) =      1.07

****************************************************************************
  FLOW PROCESS FROM NODE    371.00 TO NODE    372.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    740.00  DOWNSTREAM(FEET) =    588.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1262.00   CHANNEL SLOPE =  0.1204
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       1.07
  FLOW VELOCITY(FEET/SEC) =   4.81 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.38   Tc(MIN.) =   10.79
  LONGEST FLOWPATH FROM NODE    370.00 TO NODE    372.00 =    1476.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    371.00 TO NODE    372.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.974
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   20.63   SUBAREA RUNOFF(CFS) =   35.92
  TOTAL AREA(ACRES) =       21.1   TOTAL RUNOFF(CFS) =      36.68
  TC(MIN.) =   10.79

****************************************************************************
  FLOW PROCESS FROM NODE    372.00 TO NODE    373.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   588.00  DOWNSTREAM(FEET) =   578.00
  FLOW LENGTH(FEET) =   607.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  27.0 INCH PIPE IS  20.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.09
  ESTIMATED PIPE DIAMETER(INCH) =  27.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      36.68
  PIPE TRAVEL TIME(MIN.) =   0.91    Tc(MIN.) =   11.70
  LONGEST FLOWPATH FROM NODE    370.00 TO NODE    373.00 =    2083.00 FEET.
```

```
**************************************************************************
 FLOW PROCESS FROM NODE    373.00 TO NODE    373.00 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.) =   11.70
 RAINFALL INTENSITY(INCH/HR) =   4.72
 TOTAL STREAM AREA(ACRES) =    21.07
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     36.68

**************************************************************************
 FLOW PROCESS FROM NODE    275.00 TO NODE    276.00 IS CODE =  21
--------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   178.00
 UPSTREAM ELEVATION(FEET) =    810.00
 DOWNSTREAM ELEVATION(FEET) =    780.00
 ELEVATION DIFFERENCE(FEET) =     30.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.061
 SUBAREA RUNOFF(CFS) =      0.72
 TOTAL AREA(ACRES) =      0.29   TOTAL RUNOFF(CFS) =      0.72

**************************************************************************
 FLOW PROCESS FROM NODE    276.00 TO NODE    373.00 IS CODE =  52
--------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    780.00  DOWNSTREAM(FEET) =    578.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  2304.00   CHANNEL SLOPE =  0.0877
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.72
 FLOW VELOCITY(FEET/SEC) =   4.44 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   8.65   Tc(MIN.) =   14.91
 LONGEST FLOWPATH FROM NODE    275.00 TO NODE    373.00 =    2482.00 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    276.00 TO NODE    373.00 IS CODE =  81
--------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```



```
==========================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.036
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =   33.41   SUBAREA RUNOFF(CFS) =   47.20
 TOTAL AREA(ACRES) =       33.7   TOTAL RUNOFF(CFS) =      47.61
 TC(MIN.) =   14.91

**************************************************************************
 FLOW PROCESS FROM NODE    373.00 TO NODE    373.00 IS CODE =   1
--------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
 >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==========================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
 TIME OF CONCENTRATION(MIN.) =   14.91
 RAINFALL INTENSITY(INCH/HR) =   4.04
 TOTAL STREAM AREA(ACRES) =    33.70
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     47.61

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       36.68    11.70        4.720         21.07
     2       47.61    14.91        4.036         33.70

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1       74.03    11.70       4.720
     2       78.98    14.91       4.036

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      78.98   Tc(MIN.) =   14.91
 TOTAL AREA(ACRES) =       54.8
 LONGEST FLOWPATH FROM NODE    275.00 TO NODE    373.00 =    2482.00 FEET.

**************************************************************************
 FLOW PROCESS FROM NODE    373.00 TO NODE    944.00 IS CODE =  31
--------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==========================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   578.00  DOWNSTREAM(FEET) =   575.00
 FLOW LENGTH(FEET) =   160.00   MANNING'S N =  0.013
```

```
 DEPTH OF FLOW IN  36.0 INCH PIPE IS  26.4 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  14.22
 ESTIMATED PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      78.98
 PIPE TRAVEL TIME(MIN.) =   0.19    Tc(MIN.) =   15.10
 LONGEST FLOWPATH FROM NODE    275.00 TO NODE    944.00 =    2642.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    944.00 TO NODE    944.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1       78.98    15.10       4.004       54.77
 LONGEST FLOWPATH FROM NODE    275.00 TO NODE    944.00 =    2642.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1      175.60    29.47       2.601      105.20
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    944.00 =   10082.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc      INTENSITY
 NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1     168.94      15.10        4.004
     2     226.90      29.47        2.601

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     226.90   Tc(MIN.) =   29.47
 TOTAL AREA(ACRES) =      160.0

****************************************************************************
 FLOW PROCESS FROM NODE    944.00 TO NODE    944.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE    944.00 TO NODE    943.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   575.00  DOWNSTREAM(FEET) =   574.00
 FLOW LENGTH(FEET) =   162.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  63.0 INCH PIPE IS  51.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  11.96
```



```
 ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     226.90
 PIPE TRAVEL TIME(MIN.) =   0.23    Tc(MIN.) =   29.70
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    943.00 =   10244.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    943.00 TO NODE    943.00 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.) =   29.70
 RAINFALL INTENSITY(INCH/HR) =   2.59
 TOTAL STREAM AREA(ACRES) =   159.97
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    226.90

****************************************************************************
 FLOW PROCESS FROM NODE    904.00 TO NODE    905.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   320.00
 UPSTREAM ELEVATION(FEET) =    648.00
 DOWNSTREAM ELEVATION(FEET) =    641.00
 ELEVATION DIFFERENCE(FEET) =      7.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    9.746
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    87.81
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.311
 SUBAREA RUNOFF(CFS) =      0.99
 TOTAL AREA(ACRES) =      0.53   TOTAL RUNOFF(CFS) =      0.99

****************************************************************************
 FLOW PROCESS FROM NODE    905.00 TO NODE    942.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    641.00  DOWNSTREAM(FEET) =    580.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   655.00   CHANNEL SLOPE =  0.0931
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.99
 FLOW VELOCITY(FEET/SEC) =   4.58 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.38   Tc(MIN.) =   12.13
 LONGEST FLOWPATH FROM NODE    904.00 TO NODE    942.00 =     975.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    905.00 TO NODE    942.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.611
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =    4.50   SUBAREA RUNOFF(CFS) =    7.26
  TOTAL AREA(ACRES) =        5.0   TOTAL RUNOFF(CFS) =       8.12
  TC(MIN.) =   12.13

****************************************************************************
  FLOW PROCESS FROM NODE    942.00 TO NODE    943.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   580.00  DOWNSTREAM(FEET) =   574.00
  FLOW LENGTH(FEET) =    52.14   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.03
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       8.12
  PIPE TRAVEL TIME(MIN.) =   0.05    Tc(MIN.) =   12.18
  LONGEST FLOWPATH FROM NODE    904.00 TO NODE    943.00 =    1027.14 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    943.00 TO NODE    943.00 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.) =   12.18
  RAINFALL INTENSITY(INCH/HR) =   4.60
  TOTAL STREAM AREA(ACRES) =     5.03
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.12

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      226.90    29.70        2.588        159.97
      2        8.12    12.18        4.598          5.03

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
```



```
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      101.21    12.18       4.598
      2      231.47    29.70       2.588

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     231.47   Tc(MIN.) =   29.70
  TOTAL AREA(ACRES) =      165.0
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    943.00 =   10244.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    943.00 TO NODE    945.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   574.00  DOWNSTREAM(FEET) =   570.00
  FLOW LENGTH(FEET) =  1096.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  72.0 INCH PIPE IS  54.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.02
  ESTIMATED PIPE DIAMETER(INCH) =  72.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     231.47
  PIPE TRAVEL TIME(MIN.) =   1.82    Tc(MIN.) =   31.52
  LONGEST FLOWPATH FROM NODE    400.00 TO NODE    945.00 =   11340.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    945.00 TO NODE    945.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    922.00 TO NODE    923.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   150.00
  UPSTREAM ELEVATION(FEET) =   1780.00
  DOWNSTREAM ELEVATION(FEET) =   1760.00
  ELEVATION DIFFERENCE(FEET) =     20.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =   100.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.061
 SUBAREA RUNOFF(CFS) =      0.59
 TOTAL AREA(ACRES) =      0.24   TOTAL RUNOFF(CFS) =      0.59

****************************************************************************
 FLOW PROCESS FROM NODE    923.00 TO NODE    924.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1760.00  DOWNSTREAM(FEET) =   1330.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1040.00   CHANNEL SLOPE =  0.4135
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .2156 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.59
 FLOW VELOCITY(FEET/SEC) =   2.60 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   6.67   Tc(MIN.) =   12.93
 LONGEST FLOWPATH FROM NODE    922.00 TO NODE    924.00 =    1190.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    923.00 TO NODE    924.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.425
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =   12.01   SUBAREA RUNOFF(CFS) =   18.60
 TOTAL AREA(ACRES) =       12.2   TOTAL RUNOFF(CFS) =      18.97
 TC(MIN.) =   12.93

****************************************************************************
 FLOW PROCESS FROM NODE    924.00 TO NODE    925.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1330.00  DOWNSTREAM(FEET) =   1080.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1013.00   CHANNEL SLOPE =  0.2468
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .1789 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =      18.97
 FLOW VELOCITY(FEET/SEC) =   6.31 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.67   Tc(MIN.) =   15.61
 LONGEST FLOWPATH FROM NODE    922.00 TO NODE    925.00 =    2203.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    924.00 TO NODE    925.00 IS CODE =  81
```



```
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.920
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =   26.68   SUBAREA RUNOFF(CFS) =   36.60
 TOTAL AREA(ACRES) =       38.9   TOTAL RUNOFF(CFS) =      53.41
 TC(MIN.) =   15.61

****************************************************************************
 FLOW PROCESS FROM NODE    925.00 TO NODE    920.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1080.00  DOWNSTREAM(FEET) =    715.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1974.00   CHANNEL SLOPE =  0.1849
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .1525 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =      53.41
 FLOW VELOCITY(FEET/SEC) =   8.22 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   4.00   Tc(MIN.) =   19.61
 LONGEST FLOWPATH FROM NODE    922.00 TO NODE    920.00 =    4177.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    925.00 TO NODE    920.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.383
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =   35.14   SUBAREA RUNOFF(CFS) =   41.61
 TOTAL AREA(ACRES) =       74.1   TOTAL RUNOFF(CFS) =      87.70
 TC(MIN.) =   19.61

****************************************************************************
 FLOW PROCESS FROM NODE    920.00 TO NODE    920.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   19.61
 RAINFALL INTENSITY(INCH/HR) =   3.38
 TOTAL STREAM AREA(ACRES) =    74.07
```

```
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     87.70

****************************************************************************
 FLOW PROCESS FROM NODE    916.00 TO NODE    917.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    92.00
 UPSTREAM ELEVATION(FEET) =   1780.00
 DOWNSTREAM ELEVATION(FEET) =   1770.00
 ELEVATION DIFFERENCE(FEET) =     10.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.011
 WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.253
 SUBAREA RUNOFF(CFS) =      0.69
 TOTAL AREA(ACRES) =      0.27   TOTAL RUNOFF(CFS) =      0.69

****************************************************************************
 FLOW PROCESS FROM NODE    917.00 TO NODE    918.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1770.00  DOWNSTREAM(FEET) =   1240.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1017.00   CHANNEL SLOPE =  0.5211
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .2261 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.69
 FLOW VELOCITY(FEET/SEC) =   2.66 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   6.37   Tc(MIN.) =   12.38
 LONGEST FLOWPATH FROM NODE    916.00 TO NODE    918.00 =    1109.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    917.00 TO NODE    918.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.552
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =   11.69   SUBAREA RUNOFF(CFS) =   18.62
 TOTAL AREA(ACRES) =       12.0   TOTAL RUNOFF(CFS) =      19.05
 TC(MIN.) =   12.38

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



```
 FLOW PROCESS FROM NODE    918.00 TO NODE    919.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1240.00  DOWNSTREAM(FEET) =    990.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   987.00   CHANNEL SLOPE =  0.2533
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .1811 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =      19.05
 FLOW VELOCITY(FEET/SEC) =   6.36 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.59   Tc(MIN.) =   14.96
 LONGEST FLOWPATH FROM NODE    916.00 TO NODE    919.00 =    2096.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    918.00 TO NODE    919.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.027
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =   19.69   SUBAREA RUNOFF(CFS) =   27.76
 TOTAL AREA(ACRES) =       31.7   TOTAL RUNOFF(CFS) =      44.61
 TC(MIN.) =   14.96

****************************************************************************
 FLOW PROCESS FROM NODE    919.00 TO NODE    920.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    990.00  DOWNSTREAM(FEET) =    715.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1572.00   CHANNEL SLOPE =  0.1749
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .1475 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 CHANNEL FLOW THRU SUBAREA(CFS) =      44.61
 FLOW VELOCITY(FEET/SEC) =   7.62 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   3.44   Tc(MIN.) =   18.40
 LONGEST FLOWPATH FROM NODE    916.00 TO NODE    920.00 =    3668.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    919.00 TO NODE    920.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.524
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
```

```
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =   37.07   SUBAREA RUNOFF(CFS) =   45.73
 TOTAL AREA(ACRES) =       68.7   TOTAL RUNOFF(CFS) =      84.77
 TC(MIN.) =   18.40

****************************************************************************
 FLOW PROCESS FROM NODE    920.00 TO NODE    920.00 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.) =   18.40
 RAINFALL INTENSITY(INCH/HR) =   3.52
 TOTAL STREAM AREA(ACRES) =    68.72
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     84.77

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1       87.70    19.61        3.383         74.07
     2       84.77    18.40        3.524         68.72

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

 ** PEAK FLOW RATE TABLE **
 STREAM     RUNOFF      Tc      INTENSITY
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
     1      167.08    18.40       3.524
     2      169.07    19.61       3.383

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     169.07   Tc(MIN.) =   19.61
 TOTAL AREA(ACRES) =      142.8
 LONGEST FLOWPATH FROM NODE    922.00 TO NODE    920.00 =    4177.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    920.00 TO NODE    921.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    715.00  DOWNSTREAM(FEET) =    660.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1099.00   CHANNEL SLOPE =  0.0500
 CHANNEL FLOW THRU SUBAREA(CFS) =     169.07
 FLOW VELOCITY(FEET/SEC) =  12.46 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.47   Tc(MIN.) =   21.08
 LONGEST FLOWPATH FROM NODE    922.00 TO NODE    921.00 =    5276.00 FEET.
```



```
****************************************************************************
 FLOW PROCESS FROM NODE    921.00 TO NODE    921.00 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.) =   21.08
 RAINFALL INTENSITY(INCH/HR) =   3.23
 TOTAL STREAM AREA(ACRES) =   142.79
 PEAK FLOW RATE(CFS) AT CONFLUENCE =    169.07

****************************************************************************
 FLOW PROCESS FROM NODE    910.00 TO NODE    911.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =   1870.00
 DOWNSTREAM ELEVATION(FEET) =   1860.00
 ELEVATION DIFFERENCE(FEET) =     10.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
 WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.061
 SUBAREA RUNOFF(CFS) =      0.67
 TOTAL AREA(ACRES) =      0.27   TOTAL RUNOFF(CFS) =      0.67

****************************************************************************
 FLOW PROCESS FROM NODE    911.00 TO NODE    912.00 IS CODE =  53
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   1860.00  DOWNSTREAM(FEET) =   1350.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1055.00   CHANNEL SLOPE =  0.4834
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .2233 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.67
 FLOW VELOCITY(FEET/SEC) =   2.65 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   6.64   Tc(MIN.) =   12.91
 LONGEST FLOWPATH FROM NODE    910.00 TO NODE    912.00 =    1155.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    911.00 TO NODE    912.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
```

```
==========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.430
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   21.52   SUBAREA RUNOFF(CFS) =   33.36
  TOTAL AREA(ACRES) =       21.8   TOTAL RUNOFF(CFS) =      33.78
  TC(MIN.) =   12.91

**************************************************************************
  FLOW PROCESS FROM NODE    912.00 TO NODE    913.00 IS CODE =  53
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   1350.00  DOWNSTREAM(FEET) =    960.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1656.00   CHANNEL SLOPE =  0.2355
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .1752 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      33.78
  FLOW VELOCITY(FEET/SEC) =   7.57 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   3.65   Tc(MIN.) =   16.56
  LONGEST FLOWPATH FROM NODE    910.00 TO NODE    913.00 =    2811.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    912.00 TO NODE    913.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.773
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   43.96   SUBAREA RUNOFF(CFS) =   58.05
  TOTAL AREA(ACRES) =       65.8   TOTAL RUNOFF(CFS) =      86.83
  TC(MIN.) =   16.56

**************************************************************************
  FLOW PROCESS FROM NODE    913.00 TO NODE    921.00 IS CODE =  53
--------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    960.00  DOWNSTREAM(FEET) =    660.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  3285.00   CHANNEL SLOPE =  0.0913
  SLOPE ADJUSTMENT CURVE USED:
  EFFECTIVE SLOPE = .0913 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  CHANNEL FLOW THRU SUBAREA(CFS) =      86.83
  FLOW VELOCITY(FEET/SEC) =   7.48 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
```



```
  TRAVEL TIME(MIN.) =   7.32   Tc(MIN.) =   23.87
  LONGEST FLOWPATH FROM NODE    910.00 TO NODE    921.00 =    6096.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE    913.00 TO NODE    921.00 IS CODE =  81
--------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==========================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.980
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   63.80   SUBAREA RUNOFF(CFS) =   66.54
  TOTAL AREA(ACRES) =      129.6   TOTAL RUNOFF(CFS) =     135.10
  TC(MIN.) =   23.87

**************************************************************************
  FLOW PROCESS FROM NODE    921.00 TO NODE    921.00 IS CODE =   1
--------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
==========================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   23.87
  RAINFALL INTENSITY(INCH/HR) =   2.98
  TOTAL STREAM AREA(ACRES) =   129.55
  PEAK FLOW RATE(CFS) AT CONFLUENCE =    135.10

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1      169.07    21.08        3.229        142.79
      2      135.10    23.87        2.980        129.55

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1      288.36    21.08       3.229
      2      291.13    23.87       2.980

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =     291.13   Tc(MIN.) =   23.87
  TOTAL AREA(ACRES) =      272.3
  LONGEST FLOWPATH FROM NODE    910.00 TO NODE    921.00 =    6096.00 FEET.

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

```
 FLOW PROCESS FROM NODE    921.00 TO NODE    935.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    660.00  DOWNSTREAM(FEET) =    612.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1264.00   CHANNEL SLOPE =  0.0380
 CHANNEL FLOW THRU SUBAREA(CFS) =     291.13
 FLOW VELOCITY(FEET/SEC) =  12.85 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   1.64   Tc(MIN.) =   25.51
 LONGEST FLOWPATH FROM NODE    910.00 TO NODE    935.00 =    7360.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    921.00 TO NODE    935.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.855
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =   46.50   SUBAREA RUNOFF(CFS) =   46.46
 TOTAL AREA(ACRES) =      318.8   TOTAL RUNOFF(CFS) =     318.57
 TC(MIN.) =   25.51

****************************************************************************
 FLOW PROCESS FROM NODE    935.00 TO NODE    936.00 IS CODE =  52
----------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    612.00  DOWNSTREAM(FEET) =    575.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1394.00   CHANNEL SLOPE =  0.0265
 CHANNEL FLOW THRU SUBAREA(CFS) =     318.57
 FLOW VELOCITY(FEET/SEC) =  11.05 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.10   Tc(MIN.) =   27.62
 LONGEST FLOWPATH FROM NODE    910.00 TO NODE    936.00 =    8754.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    935.00 TO NODE    936.00 IS CODE =  81
----------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  2.713
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =   33.00   SUBAREA RUNOFF(CFS) =   31.33
 TOTAL AREA(ACRES) =      351.8   TOTAL RUNOFF(CFS) =     334.04
```



```
 TC(MIN.) =   27.62

****************************************************************************
 FLOW PROCESS FROM NODE    936.00 TO NODE    945.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   575.00  DOWNSTREAM(FEET) =   570.00
 FLOW LENGTH(FEET) =   100.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  51.0 INCH PIPE IS  38.1 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  29.39
 ESTIMATED PIPE DIAMETER(INCH) =  51.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =     334.04
 PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   27.67
 LONGEST FLOWPATH FROM NODE    910.00 TO NODE    945.00 =    8854.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    945.00 TO NODE    945.00 IS CODE =  11
----------------------------------------------------------------------------
 >>>>>CONFLUENCE MEMORY BANK # 1 WITH THE MAIN-STREAM MEMORY<<<<<
============================================================================

 ** MAIN STREAM CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1      334.04    27.67       2.709      351.84
 LONGEST FLOWPATH FROM NODE    910.00 TO NODE    945.00 =    8854.00 FEET.

 ** MEMORY BANK #  1 CONFLUENCE DATA **
 STREAM     RUNOFF      Tc      INTENSITY     AREA
 NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
     1      231.47    31.52       2.491      165.00
 LONGEST FLOWPATH FROM NODE    400.00 TO NODE    945.00 =   11340.00 FEET.

 ** PEAK FLOW RATE TABLE **
 STREAM    RUNOFF       Tc      INTENSITY
 NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
     1     537.24      27.67        2.709
     2     538.59      31.52        2.491

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =     538.59   Tc(MIN.) =   31.52
 TOTAL AREA(ACRES) =      516.8

****************************************************************************
 FLOW PROCESS FROM NODE    945.00 TO NODE    945.00 IS CODE =  12
----------------------------------------------------------------------------
 >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================
============================================================================
```

```
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      516.8  TC(MIN.) =     31.52
  PEAK FLOW RATE(CFS)   =     538.59
================================================================================
================================================================================
  END OF RATIONAL METHOD ANALYSIS
```

CHAPTER 5

5.1.4 – Rational Method Hydrologic Analysis (AES 2015)

AES Zone 4

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

          RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
          Reference: SAN DIEGO COUNTY FLOOD CONTROL DISTRICT
                       2003,1985,1981 HYDROLOGY MANUAL
       (c) Copyright 1982-2015 Advanced Engineering Software (aes)
           Ver. 22.0 Release Date: 07/01/2015  License ID 1239

                        Analysis prepared by:




------------------------------------------------------------------------
  FILE NAME: R:\1235\HYD\CALCS\AES\SRP\ATT\ZONE4.DAT
  TIME/DATE OF STUDY: 09:30 09/10/2019
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   3.100
  SPECIFIED MINIMUM PIPE SIZE(INCH) =  18.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  SAN DIEGO HYDROLOGY MANUAL "C"-VALUES USED FOR RATIONAL METHOD
  NOTE: USE MODIFIED RATIONAL METHOD PROCEDURES FOR CONFLUENCE ANALYSIS
  *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   20.0     10.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  2   20.0     10.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  3   20.0     10.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  4   20.0     10.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  5   20.0     10.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  6   20.0     10.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  7   16.0      8.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  8   20.0     10.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
  9   18.0      9.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
 10   17.0     10.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150
 11   14.0      7.0    0.020/0.020/0.020   0.50    1.50 0.0313 0.125 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
```



```
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*

+------------------------------------------------------------------------+
| BEGIN ZONE4 HYDROLOGY                                                  |
|                                                                        |
|                                                                        |
+------------------------------------------------------------------------+

+------------------------------------------------------------------------+
| BEGIN BASIN 3 UPSTREAM                                                 |
|                                                                        |
|                                                                        |
+------------------------------------------------------------------------+

************************************************************************
  FLOW PROCESS FROM NODE    950.00 TO NODE    951.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
========================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    595.00
  DOWNSTREAM ELEVATION(FEET) =    593.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.293
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    85.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.168
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      1.25
  TOTAL AREA(ACRES) =      0.18   TOTAL RUNOFF(CFS) =      1.25

************************************************************************
  FLOW PROCESS FROM NODE    951.00 TO NODE    952.00 IS CODE =  62
------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
========================================================================
  UPSTREAM ELEVATION(FEET) =  593.00  DOWNSTREAM ELEVATION(FEET) =  587.00
  STREET LENGTH(FEET) =   701.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020
```

```
 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.61
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.33
   HALFSTREET FLOOD WIDTH(FEET) =    9.97
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.07
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.67
 STREET FLOW TRAVEL TIME(MIN.) =   5.64   Tc(MIN.) =    8.93
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.619
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.850
 SUBAREA AREA(ACRES) =    1.37      SUBAREA RUNOFF(CFS) =    6.54
 TOTAL AREA(ACRES) =        1.5        PEAK FLOW RATE(CFS) =       7.40

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.37   HALFSTREET FLOOD WIDTH(FEET) =  12.15
 FLOW VELOCITY(FEET/SEC.) =  2.32   DEPTH*VELOCITY(FT*FT/SEC.) =   0.86
 LONGEST FLOWPATH FROM NODE    950.00 TO NODE    952.00 =     801.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    952.00 TO NODE    962.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   577.00  DOWNSTREAM(FEET) =   570.00
 FLOW LENGTH(FEET) =  1714.00   MANNING'S N =  0.013
 DEPTH OF FLOW IN  21.0 INCH PIPE IS  13.6 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.50
 ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       7.40
 PIPE TRAVEL TIME(MIN.) =   6.34    Tc(MIN.) =   15.27
 LONGEST FLOWPATH FROM NODE    950.00 TO NODE    962.00 =    2515.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    962.00 TO NODE    962.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  3
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =   15.27
 RAINFALL INTENSITY(INCH/HR) =   3.97
 TOTAL STREAM AREA(ACRES) =     1.55
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.40
```



```
****************************************************************************
 FLOW PROCESS FROM NODE    955.00 TO NODE    956.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    586.00
 DOWNSTREAM ELEVATION(FEET) =    585.00
 ELEVATION DIFFERENCE(FEET) =      1.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.765
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    70.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.168
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      1.11
 TOTAL AREA(ACRES) =      0.16   TOTAL RUNOFF(CFS) =      1.11

****************************************************************************
 FLOW PROCESS FROM NODE    956.00 TO NODE    962.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  585.00  DOWNSTREAM ELEVATION(FEET) =  577.00
 STREET LENGTH(FEET) =   854.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.44
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.32
   HALFSTREET FLOOD WIDTH(FEET) =    9.63
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.12
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.68
 STREET FLOW TRAVEL TIME(MIN.) =   6.71   Tc(MIN.) =   10.48
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.068
 *USER SPECIFIED(SUBAREA):
```

```
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.850
  SUBAREA AREA(ACRES) =    1.49      SUBAREA RUNOFF(CFS) =    6.42
  TOTAL AREA(ACRES) =        1.6        PEAK FLOW RATE(CFS) =       7.11

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  11.76
  FLOW VELOCITY(FEET/SEC.) =  2.37   DEPTH*VELOCITY(FT*FT/SEC.) =   0.86
  LONGEST FLOWPATH FROM NODE    955.00 TO NODE    962.00 =     954.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    962.00 TO NODE    962.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =   10.48
  RAINFALL INTENSITY(INCH/HR) =   5.07
  TOTAL STREAM AREA(ACRES) =     1.65
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.11

****************************************************************************
  FLOW PROCESS FROM NODE    960.00 TO NODE    961.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    90.00
  UPSTREAM ELEVATION(FEET) =    585.40
  DOWNSTREAM ELEVATION(FEET) =    584.60
  ELEVATION DIFFERENCE(FEET) =      0.80
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.789
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    65.56
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.168
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      1.11
  TOTAL AREA(ACRES) =      0.16   TOTAL RUNOFF(CFS) =      1.11

****************************************************************************
  FLOW PROCESS FROM NODE    961.00 TO NODE    962.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
```



```
  UPSTREAM ELEVATION(FEET) =  584.60  DOWNSTREAM ELEVATION(FEET) =  577.00
  STREET LENGTH(FEET) =   751.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       4.64
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.32
    HALFSTREET FLOOD WIDTH(FEET) =    9.63
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.21
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.71
  STREET FLOW TRAVEL TIME(MIN.) =   5.65   Tc(MIN.) =    9.44
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.421
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.850
  SUBAREA AREA(ACRES) =    1.49      SUBAREA RUNOFF(CFS) =    6.87
  TOTAL AREA(ACRES) =        1.6        PEAK FLOW RATE(CFS) =       7.60

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.36   HALFSTREET FLOOD WIDTH(FEET) =  11.91
  FLOW VELOCITY(FEET/SEC.) =  2.47   DEPTH*VELOCITY(FT*FT/SEC.) =   0.90
  LONGEST FLOWPATH FROM NODE    960.00 TO NODE    962.00 =     841.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    962.00 TO NODE    962.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =    9.44
  RAINFALL INTENSITY(INCH/HR) =   5.42
  TOTAL STREAM AREA(ACRES) =     1.65
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      7.60

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        7.40    15.27        3.975          1.55
      2        7.11    10.48        5.068          1.65
```

```
     3        7.60     9.44        5.421          1.65

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  3 STREAMS.

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       18.58     9.44       5.421
      2       19.29    10.48       5.068
      3       18.55    15.27       3.975

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      19.29   Tc(MIN.) =   10.48
  TOTAL AREA(ACRES) =        4.8
  LONGEST FLOWPATH FROM NODE    950.00 TO NODE    962.00 =    2515.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    962.00 TO NODE      3.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   571.00  DOWNSTREAM(FEET) =   570.00
  FLOW LENGTH(FEET) =    40.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  14.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.25
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      19.29
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   10.54
  LONGEST FLOWPATH FROM NODE    950.00 TO NODE      3.00 =    2555.00 FEET.

+--------------------------------------------------------------------------+
| APPLY CODE 7 IN BASIN 3 FOR ATTENUATED OUTFLOW                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  30.54   RAIN INTENSITY(INCH/HOUR) =  2.54
  TOTAL AREA(ACRES) =     4.80   TOTAL RUNOFF(CFS) =      2.30

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE    963.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
```



```
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   570.00  DOWNSTREAM(FEET) =   569.00
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   5.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.62
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.30
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   30.72
  LONGEST FLOWPATH FROM NODE    950.00 TO NODE    963.00 =    2615.00 FEET.

+--------------------------------------------------------------------------+
| END BASIN 3                                                              |
| BEGIN BASIN 4                                                            |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    965.00 TO NODE    966.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    80.00
  UPSTREAM ELEVATION(FEET) =    585.40
  DOWNSTREAM ELEVATION(FEET) =    584.36
  ELEVATION DIFFERENCE(FEET) =      1.04
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.559
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    74.50
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.168
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      1.11
  TOTAL AREA(ACRES) =      0.16   TOTAL RUNOFF(CFS) =      1.11

****************************************************************************
  FLOW PROCESS FROM NODE    966.00 TO NODE    967.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  584.35  DOWNSTREAM ELEVATION(FEET) =  579.00
  STREET LENGTH(FEET) =   558.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
```

```
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       3.54
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.30
   HALFSTREET FLOOD WIDTH(FEET) =    8.64
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.05
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.61
 STREET FLOW TRAVEL TIME(MIN.) =   4.54   Tc(MIN.) =    8.10
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.983
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.850
 SUBAREA AREA(ACRES) =    0.94      SUBAREA RUNOFF(CFS) =    4.78
 TOTAL AREA(ACRES) =        1.1        PEAK FLOW RATE(CFS) =       5.59

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.59
 FLOW VELOCITY(FEET/SEC.) =  2.26   DEPTH*VELOCITY(FT*FT/SEC.) =   0.76
 LONGEST FLOWPATH FROM NODE    965.00 TO NODE    967.00 =     638.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    967.00 TO NODE    972.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   575.00  DOWNSTREAM(FEET) =   565.00
 FLOW LENGTH(FEET) =   900.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   9.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   6.16
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =       5.59
 PIPE TRAVEL TIME(MIN.) =   2.43    Tc(MIN.) =   10.53
 LONGEST FLOWPATH FROM NODE    965.00 TO NODE    972.00 =    1538.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    972.00 TO NODE    972.00 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.) =   10.53
 RAINFALL INTENSITY(INCH/HR) =   5.05
 TOTAL STREAM AREA(ACRES) =     1.10
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.59

****************************************************************************
 FLOW PROCESS FROM NODE    970.00 TO NODE    971.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    578.90
 DOWNSTREAM ELEVATION(FEET) =    577.90
 ELEVATION DIFFERENCE(FEET) =      1.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.765
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    70.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.168
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      1.32
 TOTAL AREA(ACRES) =      0.19   TOTAL RUNOFF(CFS) =      1.32

****************************************************************************
 FLOW PROCESS FROM NODE    971.00 TO NODE    972.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  577.90  DOWNSTREAM ELEVATION(FEET) =  570.00
 STREET LENGTH(FEET) =   782.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.41
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.35
   HALFSTREET FLOOD WIDTH(FEET) =   11.05
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.39
```

```
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.83
  STREET FLOW TRAVEL TIME(MIN.) =   5.45   Tc(MIN.) =    9.21
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.507
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.850
  SUBAREA AREA(ACRES) =    2.12      SUBAREA RUNOFF(CFS) =    9.92
  TOTAL AREA(ACRES) =        2.3        PEAK FLOW RATE(CFS) =      10.81

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.40   HALFSTREET FLOOD WIDTH(FEET) =  13.71
  FLOW VELOCITY(FEET/SEC.) =  2.71   DEPTH*VELOCITY(FT*FT/SEC.) =   1.08
  LONGEST FLOWPATH FROM NODE    970.00 TO NODE    972.00 =     882.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    972.00 TO NODE    972.00 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.) =    9.21
  RAINFALL INTENSITY(INCH/HR) =   5.51
  TOTAL STREAM AREA(ACRES) =     2.31
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.81

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        5.59    10.53        5.051         1.10
      2       10.81     9.21        5.507         2.31

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       15.71     9.21       5.507
      2       15.51    10.53       5.051

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      15.71   Tc(MIN.) =    9.21
  TOTAL AREA(ACRES) =        3.4
  LONGEST FLOWPATH FROM NODE    965.00 TO NODE    972.00 =    1538.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    972.00 TO NODE      4.00 IS CODE =  31
----------------------------------------------------------------------------
```



```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   570.00  DOWNSTREAM(FEET) =   562.50
  FLOW LENGTH(FEET) =    78.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   8.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  17.92
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      15.71
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =    9.28
  LONGEST FLOWPATH FROM NODE    965.00 TO NODE      4.00 =    1616.00 FEET.

+--------------------------------------------------------------------------+
| APPLY CODE 7 IN BASIN 4 FOR ATTENUATED OUTFLOW                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  19.28   RAIN INTENSITY(INCH/HOUR) =  3.42
  TOTAL AREA(ACRES) =     3.40   TOTAL RUNOFF(CFS) =      6.60

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE    973.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   562.50  DOWNSTREAM(FEET) =   560.00
  FLOW LENGTH(FEET) =    70.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
  DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.91
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       6.60
  PIPE TRAVEL TIME(MIN.) =   0.12    Tc(MIN.) =   19.40
  LONGEST FLOWPATH FROM NODE    965.00 TO NODE    973.00 =    1686.00 FEET.

+--------------------------------------------------------------------------+
| END BASIN 4                                                              |
| BEGIN BASIN 5                                                            |
|                                                                          |
+--------------------------------------------------------------------------+

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

```
 FLOW PROCESS FROM NODE    975.00 TO NODE    976.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    574.80
 DOWNSTREAM ELEVATION(FEET) =    573.90
 ELEVATION DIFFERENCE(FEET) =      0.90
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.786
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    66.00
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.168
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      1.11
 TOTAL AREA(ACRES) =      0.16   TOTAL RUNOFF(CFS) =      1.11

****************************************************************************
 FLOW PROCESS FROM NODE    976.00 TO NODE    977.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  573.90  DOWNSTREAM ELEVATION(FEET) =  563.40
 STREET LENGTH(FEET) =  1089.00   CURB HEIGHT(INCHES) =  6.0
 STREET HALFWIDTH(FEET) = 20.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.020
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

 SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
 STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
 Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
 Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

   **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =      11.04
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.41
   HALFSTREET FLOOD WIDTH(FEET) =   13.95
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.67
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.08
 STREET FLOW TRAVEL TIME(MIN.) =   6.79   Tc(MIN.) =   10.57
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.039
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8500
 S.C.S. CURVE NUMBER (AMC II) =   0
```



```
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.850
 SUBAREA AREA(ACRES) =    4.46      SUBAREA RUNOFF(CFS) =   19.10
 TOTAL AREA(ACRES) =        4.6        PEAK FLOW RATE(CFS) =      19.79

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.48   HALFSTREET FLOOD WIDTH(FEET) =  17.62
 FLOW VELOCITY(FEET/SEC.) =  3.07   DEPTH*VELOCITY(FT*FT/SEC.) =   1.47
 *NOTE: INITIAL SUBAREA NOMOGRAPH WITH SUBAREA PARAMETERS,
        AND L = 1089.0 FT WITH ELEVATION-DROP =  10.5 FT, IS   31.0 CFS,
        WHICH EXCEEDS THE TOP-OF-CURB STREET CAPACITY AT NODE    977.00
 LONGEST FLOWPATH FROM NODE    975.00 TO NODE    977.00 =    1189.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE    977.00 TO NODE    977.00 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.) =   10.57
 RAINFALL INTENSITY(INCH/HR) =   5.04
 TOTAL STREAM AREA(ACRES) =     4.62
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     19.79

****************************************************************************
 FLOW PROCESS FROM NODE    980.00 TO NODE    981.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =    98.00
 UPSTREAM ELEVATION(FEET) =    626.00
 DOWNSTREAM ELEVATION(FEET) =    624.00
 ELEVATION DIFFERENCE(FEET) =      2.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.283
 WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
          THE MAXIMUM OVERLAND FLOW LENGTH =    85.61
          (Reference: Table 3-1B of Hydrology Manual)
          THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  8.168
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      1.25
 TOTAL AREA(ACRES) =      0.18   TOTAL RUNOFF(CFS) =      1.25

****************************************************************************
 FLOW PROCESS FROM NODE    981.00 TO NODE    982.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  2 USED)<<<<<
```

```
==============================================================================
  UPSTREAM ELEVATION(FEET) =  624.00  DOWNSTREAM ELEVATION(FEET) =  592.00
  STREET LENGTH(FEET) =   910.00   CURB HEIGHT(INCHES) =  6.0
  STREET HALFWIDTH(FEET) = 20.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  10.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.020
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.020

  SPECIFIED NUMBER OF HALFSTREETS CARRYING RUNOFF =  2
  STREET PARKWAY CROSSFALL(DECIMAL)  =  0.020
  Manning's FRICTION FACTOR for Streetflow Section(curb-to-curb) =   0.0150
  Manning's FRICTION FACTOR for Back-of-Walk Flow Section =   0.0200

    **TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.26
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    8.37
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.82
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.12
  STREET FLOW TRAVEL TIME(MIN.) =   3.97   Tc(MIN.) =    7.25
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.427
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .8500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.850
  SUBAREA AREA(ACRES) =    1.81      SUBAREA RUNOFF(CFS) =    9.89
  TOTAL AREA(ACRES) =        2.0        PEAK FLOW RATE(CFS) =      10.87

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.34   HALFSTREET FLOOD WIDTH(FEET) =  10.66
  FLOW VELOCITY(FEET/SEC.) =  4.33   DEPTH*VELOCITY(FT*FT/SEC.) =   1.47
  LONGEST FLOWPATH FROM NODE    980.00 TO NODE    982.00 =    1008.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    982.00 TO NODE    977.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   585.00  DOWNSTREAM(FEET) =   560.00
  FLOW LENGTH(FEET) =   948.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  10.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.03
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      10.87
  PIPE TRAVEL TIME(MIN.) =   1.58    Tc(MIN.) =    8.83
  LONGEST FLOWPATH FROM NODE    980.00 TO NODE    977.00 =    1956.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    977.00 TO NODE    977.00 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.) =    8.83
  RAINFALL INTENSITY(INCH/HR) =   5.66
  TOTAL STREAM AREA(ACRES) =     1.99
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     10.87

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1       19.79    10.57        5.039          4.62
      2       10.87     8.83        5.661          1.99

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1       27.39     8.83       5.661
      2       29.47    10.57       5.039

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      29.47   Tc(MIN.) =   10.57
  TOTAL AREA(ACRES) =        6.6
  LONGEST FLOWPATH FROM NODE    980.00 TO NODE    977.00 =    1956.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    977.00 TO NODE      5.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   560.00  DOWNSTREAM(FEET) =   557.25
  FLOW LENGTH(FEET) =    60.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  15.4 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.54
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      29.47
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =   10.64
  LONGEST FLOWPATH FROM NODE    980.00 TO NODE      5.00 =    2016.00 FEET.

+----------------------------------------------------------------------------+
| APPLY CODE 7 IN BASIN 5 FOR ATTENUATED OUTFLOW                             |
|                                                                            |
|                                                                            |
+----------------------------------------------------------------------------+
```

```
****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      5.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  20.64   RAIN INTENSITY(INCH/HOUR) =  3.27
  TOTAL AREA(ACRES) =     6.60   TOTAL RUNOFF(CFS) =     16.40

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE    984.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   557.25  DOWNSTREAM(FEET) =   550.00
  FLOW LENGTH(FEET) =   295.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  10.81
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      16.40
  PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =   21.09
  LONGEST FLOWPATH FROM NODE    980.00 TO NODE    984.00 =    2311.00 FEET.

+--------------------------------------------------------------------------+
| END BASIN 5                                                              |
| BEGIN ONSITE CULVERTS                                                    |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    985.00 TO NODE    986.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    715.00
  DOWNSTREAM ELEVATION(FEET) =    705.00
  ELEVATION DIFFERENCE(FEET) =     10.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.267
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  7.061
  SUBAREA RUNOFF(CFS) =      0.47
  TOTAL AREA(ACRES) =      0.19   TOTAL RUNOFF(CFS) =      0.47

****************************************************************************
  FLOW PROCESS FROM NODE    986.00 TO NODE    987.00 IS CODE =  52
```



```
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    700.00  DOWNSTREAM(FEET) =    560.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1154.00   CHANNEL SLOPE =  0.1213
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  NOTE: CHANNEL SLOPE OF .1 WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.47
  FLOW VELOCITY(FEET/SEC) =   4.74 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.05   Tc(MIN.) =   10.32
  LONGEST FLOWPATH FROM NODE    985.00 TO NODE    987.00 =    1254.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    986.00 TO NODE    987.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.118
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   14.04   SUBAREA RUNOFF(CFS) =   25.15
  TOTAL AREA(ACRES) =       14.2   TOTAL RUNOFF(CFS) =      25.49
  TC(MIN.) =   10.32

****************************************************************************
  FLOW PROCESS FROM NODE    987.00 TO NODE    988.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   560.00  DOWNSTREAM(FEET) =   550.00
  FLOW LENGTH(FEET) =   177.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  21.0 INCH PIPE IS  12.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  16.48
  ESTIMATED PIPE DIAMETER(INCH) =  21.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      25.49
  PIPE TRAVEL TIME(MIN.) =   0.18    Tc(MIN.) =   10.50
  LONGEST FLOWPATH FROM NODE    985.00 TO NODE    988.00 =    1431.00 FEET.

+--------------------------------------------------------------------------+
| END CULVERT                                                              |
| BEGIN NEW CULVERT                                                        |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    990.00 TO NODE    991.00 IS CODE =  21
----------------------------------------------------------------------------
```

```
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==============================================================================
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    677.00
 DOWNSTREAM ELEVATION(FEET) =    670.00
 ELEVATION DIFFERENCE(FEET) =      7.00
 SUBAREA OVERLAND TIME OF FLOW(MIN.) =    7.058
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.540
 SUBAREA RUNOFF(CFS) =      0.16
 TOTAL AREA(ACRES) =      0.07   TOTAL RUNOFF(CFS) =      0.16

******************************************************************************
 FLOW PROCESS FROM NODE    991.00 TO NODE    992.00 IS CODE =  53
------------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL MOUNTAIN CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    670.00  DOWNSTREAM(FEET) =    570.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   513.00   CHANNEL SLOPE =  0.1949
 SLOPE ADJUSTMENT CURVE USED:
 EFFECTIVE SLOPE = .1575 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
 CHANNEL FLOW THRU SUBAREA(CFS) =       0.16
 FLOW VELOCITY(FEET/SEC) =   2.22 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   3.85   Tc(MIN.) =   10.91
 LONGEST FLOWPATH FROM NODE    990.00 TO NODE    992.00 =     613.00 FEET.

******************************************************************************
 FLOW PROCESS FROM NODE    991.00 TO NODE    992.00 IS CODE =  81
------------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.939
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
 SUBAREA AREA(ACRES) =    7.79   SUBAREA RUNOFF(CFS) =   13.47
 TOTAL AREA(ACRES) =        7.9   TOTAL RUNOFF(CFS) =      13.59
 TC(MIN.) =   10.91

******************************************************************************
 FLOW PROCESS FROM NODE    992.00 TO NODE    993.00 IS CODE =  31
------------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =   570.00  DOWNSTREAM(FEET) =   545.00
```



```
 FLOW LENGTH(FEET) =   160.00   MANNING'S N =  0.013
 ESTIMATED PIPE DIAMETER(INCH) INCREASED TO 18.000
 DEPTH OF FLOW IN  18.0 INCH PIPE IS   7.2 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =  20.64
 ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
 PIPE-FLOW(CFS) =      13.59
 PIPE TRAVEL TIME(MIN.) =   0.13    Tc(MIN.) =   11.03
 LONGEST FLOWPATH FROM NODE    990.00 TO NODE    993.00 =     773.00 FEET.

+----------------------------------------------------------------------------+
| END CULVERT                                                                |
| BEGIN NEW CULVERT                                                          |
| BASIN 5 LEFT SIDE, APPLE CODE 7 FROM ROLLING HILLS RANCH HYD STUDY         |
+----------------------------------------------------------------------------+

******************************************************************************
 FLOW PROCESS FROM NODE    997.00 TO NODE    998.00 IS CODE =   7
------------------------------------------------------------------------------
 >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
==============================================================================
 USER-SPECIFIED VALUES ARE AS FOLLOWS:
 TC(MIN) =  20.40   RAIN INTENSITY(INCH/HOUR) =  3.30
 TOTAL AREA(ACRES) =   718.00   TOTAL RUNOFF(CFS) =   1373.90

******************************************************************************
 FLOW PROCESS FROM NODE    997.00 TO NODE    998.00 IS CODE =  52
------------------------------------------------------------------------------
 >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA<<<<<
==============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    600.00  DOWNSTREAM(FEET) =    559.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =  1925.00   CHANNEL SLOPE =  0.0213
 CHANNEL FLOW THRU SUBAREA(CFS) =    1373.90
 FLOW VELOCITY(FEET/SEC) =  15.88 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
 TRAVEL TIME(MIN.) =   2.02   Tc(MIN.) =   22.42
 LONGEST FLOWPATH FROM NODE    990.00 TO NODE    998.00 =    2698.00 FEET.

******************************************************************************
 FLOW PROCESS FROM NODE    997.00 TO NODE    998.00 IS CODE =  81
------------------------------------------------------------------------------
 >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
==============================================================================
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.103
 *USER SPECIFIED(SUBAREA):
 RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
 S.C.S. CURVE NUMBER (AMC II) =   0
 AREA-AVERAGE RUNOFF COEFFICIENT = 0.5702
 SUBAREA AREA(ACRES) =   32.59   SUBAREA RUNOFF(CFS) =   35.39
 TOTAL AREA(ACRES) =      750.6   TOTAL RUNOFF(CFS) =    1373.90
 TC(MIN.) =   22.42
 NOTE: PEAK FLOW RATE DEFAULTED TO UPSTREAM VALUE
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    998.00 TO NODE    998.00 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.) =   22.42
  RAINFALL INTENSITY(INCH/HR) =   3.10
  TOTAL STREAM AREA(ACRES) =   750.59
  PEAK FLOW RATE(CFS) AT CONFLUENCE =   1373.90

****************************************************************************
  FLOW PROCESS FROM NODE    998.10 TO NODE    998.20 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    745.00
  DOWNSTREAM ELEVATION(FEET) =    742.00
  ELEVATION DIFFERENCE(FEET) =      3.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    9.361
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.451
  SUBAREA RUNOFF(CFS) =      0.17
  TOTAL AREA(ACRES) =      0.09   TOTAL RUNOFF(CFS) =      0.17

****************************************************************************
  FLOW PROCESS FROM NODE    998.20 TO NODE    998.30 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    742.00  DOWNSTREAM(FEET) =    650.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1153.00   CHANNEL SLOPE =  0.0798
  NOTE: CHANNEL FLOW OF 1. CFS WAS ASSUMED IN VELOCITY ESTIMATION
  CHANNEL FLOW THRU SUBAREA(CFS) =       0.17
  FLOW VELOCITY(FEET/SEC) =   4.24 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.54   Tc(MIN.) =   13.90
  LONGEST FLOWPATH FROM NODE    998.10 TO NODE    998.30 =    1253.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    998.20 TO NODE    998.30 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.224
  *USER SPECIFIED(SUBAREA):
```



```
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   10.82   SUBAREA RUNOFF(CFS) =   16.00
  TOTAL AREA(ACRES) =       10.9   TOTAL RUNOFF(CFS) =      16.13
  TC(MIN.) =   13.90

****************************************************************************
  FLOW PROCESS FROM NODE    998.30 TO NODE    998.00 IS CODE =  52
----------------------------------------------------------------------------
  >>>>>COMPUTE NATURAL VALLEY CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    650.00  DOWNSTREAM(FEET) =    559.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =  1816.00   CHANNEL SLOPE =  0.0501
  CHANNEL FLOW THRU SUBAREA(CFS) =      16.13
  FLOW VELOCITY(FEET/SEC) =   6.33 (PER LACFCD/RCFC&WCD HYDROLOGY MANUAL)
  TRAVEL TIME(MIN.) =   4.78   Tc(MIN.) =   18.68
  LONGEST FLOWPATH FROM NODE    998.10 TO NODE    998.00 =    3069.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    998.30 TO NODE    998.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.491
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.3500
  SUBAREA AREA(ACRES) =   36.38   SUBAREA RUNOFF(CFS) =   44.45
  TOTAL AREA(ACRES) =       47.3   TOTAL RUNOFF(CFS) =      57.78
  TC(MIN.) =   18.68

****************************************************************************
  FLOW PROCESS FROM NODE    998.00 TO NODE    998.00 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.) =   18.68
  RAINFALL INTENSITY(INCH/HR) =   3.49
  TOTAL STREAM AREA(ACRES) =    47.29
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     57.78

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1     1373.90    22.42        3.103        750.59
```

```
     2       57.78    18.68        3.491         47.29

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

  ** PEAK FLOW RATE TABLE **
  STREAM     RUNOFF      Tc      INTENSITY
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)
      1     1202.16    18.68       3.491
      2     1425.26    22.42       3.103

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =    1425.26   Tc(MIN.) =   22.42
  TOTAL AREA(ACRES) =      797.9
  LONGEST FLOWPATH FROM NODE    998.10 TO NODE    998.00 =    3069.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    998.00 TO NODE    999.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   559.00  DOWNSTREAM(FEET) =   550.00
  FLOW LENGTH(FEET) =   210.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  90.0 INCH PIPE IS  68.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  39.79
  ESTIMATED PIPE DIAMETER(INCH) =  90.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =    1425.26
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =   22.51
  LONGEST FLOWPATH FROM NODE    998.10 TO NODE    999.00 =    3279.00 FEET.

+--------------------------------------------------------------------------+
| APPLY CODE 7 FROM ROLLING HILLS RANCH HYD STUDY                          |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+

****************************************************************************
  FLOW PROCESS FROM NODE    994.00 TO NODE    994.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =  22.29   RAIN INTENSITY(INCH/HOUR) =  3.11
  TOTAL AREA(ACRES) =   261.03   TOTAL RUNOFF(CFS) =    469.76

****************************************************************************
  FLOW PROCESS FROM NODE    994.00 TO NODE    995.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
```



```
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   605.00  DOWNSTREAM(FEET) =   600.00
  FLOW LENGTH(FEET) =   233.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  66.0 INCH PIPE IS  52.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  23.00
  ESTIMATED PIPE DIAMETER(INCH) =  66.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     469.76
  PIPE TRAVEL TIME(MIN.) =   0.17    Tc(MIN.) =   22.46
  LONGEST FLOWPATH FROM NODE    998.10 TO NODE    995.00 =    3512.00 FEET.

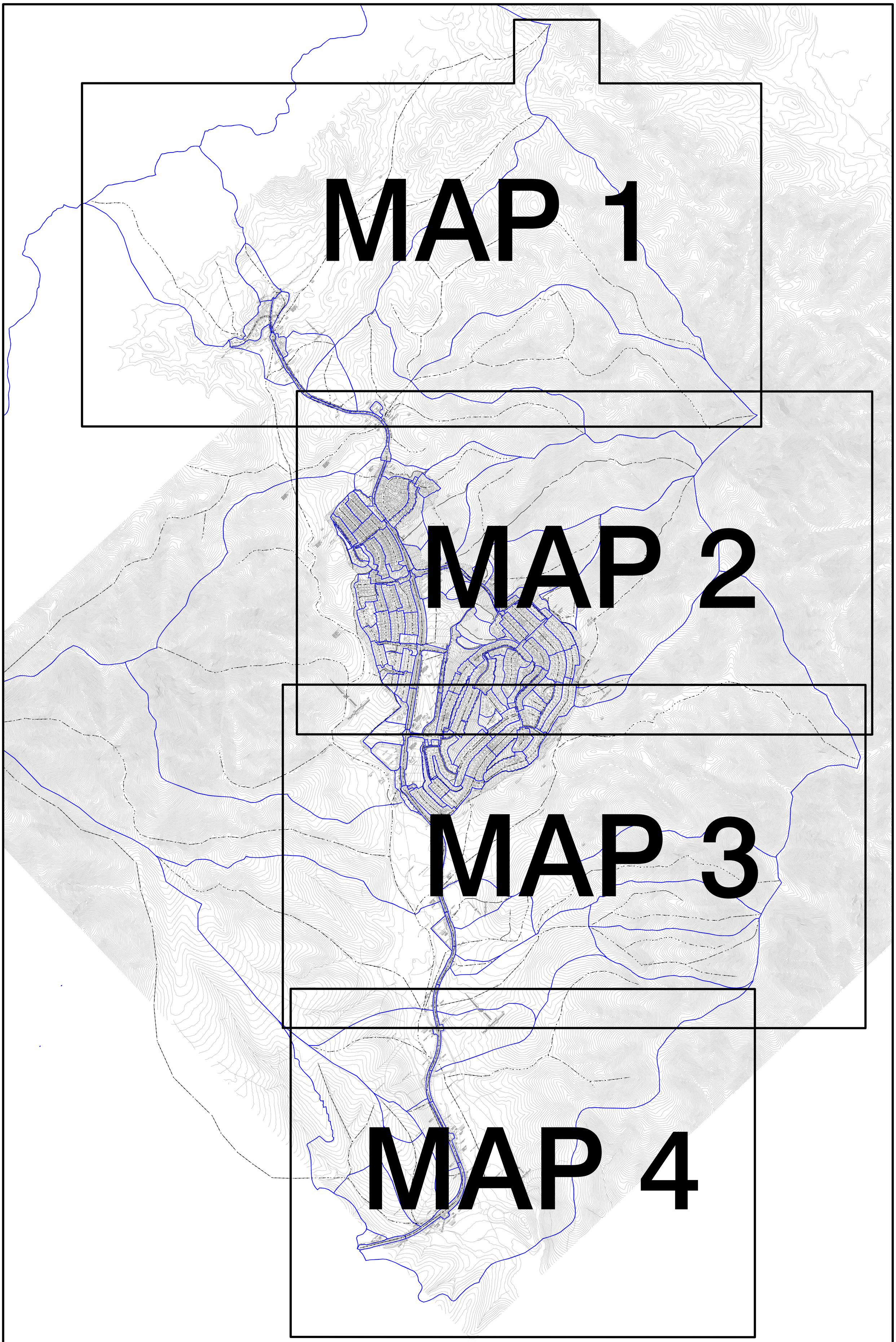
****************************************************************************
  FLOW PROCESS FROM NODE    994.00 TO NODE    995.00 IS CODE =  81
----------------------------------------------------------------------------
  >>>>>ADDITION OF SUBAREA TO MAINLINE PEAK FLOW<<<<<
============================================================================
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.099
  *USER SPECIFIED(SUBAREA):
  RESIDENTIAL (1. DU/AC OR LESS) RUNOFF COEFFICIENT = .3500
  S.C.S. CURVE NUMBER (AMC II) =   0
  AREA-AVERAGE RUNOFF COEFFICIENT = 0.5754
  SUBAREA AREA(ACRES) =    2.78   SUBAREA RUNOFF(CFS) =    3.02
  TOTAL AREA(ACRES) =      263.8   TOTAL RUNOFF(CFS) =     470.50
  TC(MIN.) =   22.46

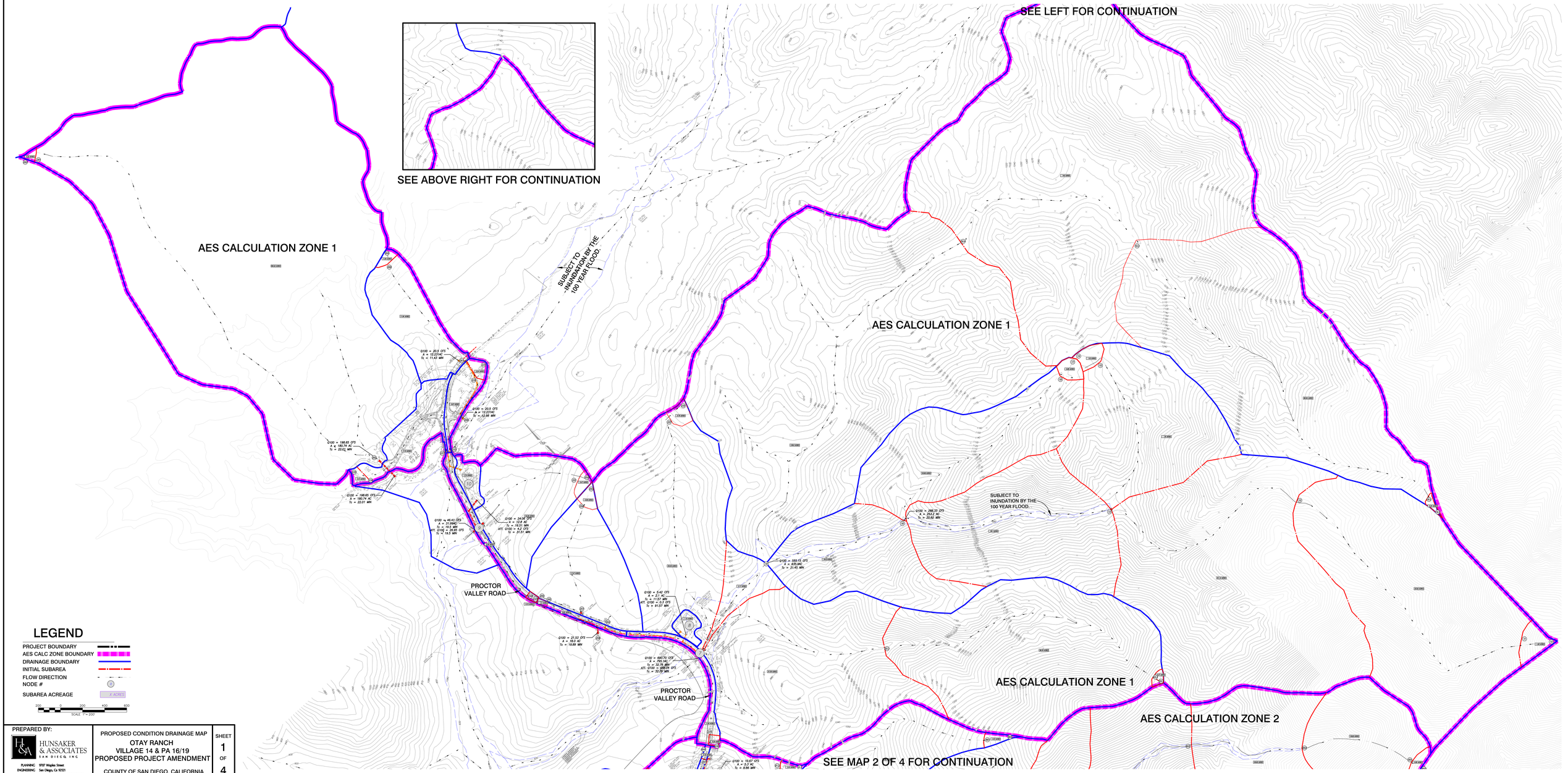
****************************************************************************
  FLOW PROCESS FROM NODE    995.00 TO NODE    996.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   600.00  DOWNSTREAM(FEET) =   575.00
  FLOW LENGTH(FEET) =   771.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  63.0 INCH PIPE IS  46.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  27.23
  ESTIMATED PIPE DIAMETER(INCH) =  63.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =     470.50
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =   22.93
  LONGEST FLOWPATH FROM NODE    998.10 TO NODE    996.00 =    4283.00 FEET.

+--------------------------------------------------------------------------+
| END ZONE 4 HYD                                                           |
|                                                                          |
|                                                                          |
+--------------------------------------------------------------------------+
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =      263.8  TC(MIN.) =     22.93
  PEAK FLOW RATE(CFS)   =     470.50
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

CHAPTER 5

5.1.5 – Rational Proposed Condition Hydrology Maps


MAP 1
MAP 2
MAP 3
MAP 4



PREPARED BY:

HUNSAKER & ASSOCIATES SAN DIEGO, INC

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PROPOSED CONDITION DRAINAGE MAP
OTAY RANCH
VILLAGE 14 & PA 16/19
PROPOSED PROJECT AMENDMENT
COUNTY OF SAN DIEGO, CALIFORNIA

SHEET 1 OF 4

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PROPOSED CONDITION DRAINAGE MAP
OTAY RANCH
VILLAGE 14 & PA 16/19
PROPOSED PROJECT AMENDMENT
COUNTY OF SAN DIEGO, CALIFORNIA

SHEET 2 OF 4

LEGEND

- PROJECT BOUNDARY
- AES CALC ZONE BOUNDARY
- DRAINAGE BOUNDARY
- INITIAL SUBAREA
- FLOW DIRECTION
- NODE # (X)
- SUBAREA ACREAGE (X ACRES)

200 0 200 400 600
SCALE 1" = 200'

VALLEY ROAD

AES CALCULATION ZONE1

SEE MAP 1 OF 4 FOR CONTINUATION

AES CALCULATION ZONE 2

AES CALCULATION ZONE 3

SUBJECT TO INUNDATION BY THE 100 YEAR FLOOD.

SUBJECT TO INUNDATION BY THE 100 YEAR FLOOD.

SUBJECT TO INUNDATION BY THE 100 YEAR FLOOD.

SEE MAP 3 OF 4 FOR CONTINUATION

Q100 = 10.67 CFS
A = 5.3 AC
Tc = 8.66 MIN

Q100 = 15.18 CFS
A = 6.9 AC
Tc = 7.52 MIN

Q100 = 24.75 CFS
A = 20.6 AC
Tc = 19.18 MIN

Q100 = 18.81 CFS
A = 10.3 AC
Tc = 10.06 MIN

Q100 = 281.34 CFS
A = 216.2 AC
Tc = 16.02 MIN

Q100 = 10.74 CFS
A = 7.1 AC
Tc = 14.1 MIN

Q100 = 9.73 CFS
A = 7 AC
Tc = 7.24 MIN

Q100 = 96.55 CFS
A = 25.2 AC
Tc = 12.26 MIN

Q100 = 117.65 CFS
A = 73.6 AC
Tc = 12.7 MIN

Q100 = 271.71 CFS
A = 86 AC
Tc = 11.62 MIN
ATT. Q100 = 157.7 CFS
Tc = 21.62 MIN

Q100 = 15.02 CFS
A = 10.7 AC
Tc = 15.01 MIN

Q100 = 17.44 CFS
A = 9.3 AC
Tc = 9.56 MIN

Q100 = 3.89 CFS
A = 1.8 AC
Tc = 7.71 MIN

Q100 = 229.8 CFS
A = 186.8 AC
Tc = 18.79 MIN

Q100 = 18.63 CFS
A = 10.1 AC
Tc = 9.9 MIN

Q100 = 256.2 CFS
A = 209.6 AC
Tc = 19.12 MIN

Q100 = 501.5 CFS
A = 224.5 AC

R-4 60X100

R-5 75X100

R-3 50X85

R-2 40X110

R-1 40X90

R-7

PP-5 PARK

PP-3 PARK

PP-2 PARK

MU-1 MIXED USE

MU-2 MIXED USE

P-1 PARK

S-1 SCHOOL

OS-3B BIOLOGICAL OPEN SPACE

SEE MAP 2 OF 4 FOR CONTINUATION

AES CALCULATION ZONE 2

AES CALCULATION ZONE 3

AES CALCULATION ZONE 3

AES CALCULATION ZONE 3

AES CALCULATION ZONE 4

AES CALCULATION ZONE 4

SEE MAP 4 OF 4 FOR CONTINUATION

PROCTOR VALLEY ROAD

PROCTOR VALLEY ROAD

PROCTOR VALLEY ROAD

SUBJECT TO INUNDATION BY THE 100 YEAR FLOOD.

SUBJECT TO INUNDATION BY THE 100 YEAR FLOOD.

Q100 = 901.5 CFS
A = 224.5 AC
Tc = 13.26 MIN
ATT. Q100 = 337.8 CFS
Tc = 28.26 MIN

Q100 = 1120.1 CFS
A = 648.5 AC
Tc = 19.50 MIN
ATT. Q100 = 787.19 CFS
Tc = 19.65 MIN

Q100 = 809.04 CFS
A = 634.2 AC
Tc = 26.74 MIN

Q100 = 36.68 CFS
A = 21.1 AC
Tc = 10.79 MIN

Q100 = 47.61 CFS
A = 33.7 AC
Tc = 14.91 MIN

Q100 = 301.82 CFS
A = 105.2 AC
14.36 MIN
ATT. OUTFLOW Q100 = 175.6 CFS
Tc = 29.36 MIN

Q100 = 8.12 CFS
A = 5.0 AC
Tc = 12.13 MIN

Q100 = 599.57 CFS
A = 510.3 AC
Tc = 27.67 MIN
ATT. Q100 = 331.04 CFS
Tc = 31.53 MIN

Q100 = 334.04 CFS
A = 351.8 AC
Tc = 27.62 MIN

Q100 = 18.63 CFS
A = 10.1 AC
Tc = 9.9 MIN

Q100 = 256.2 CFS
A = 209.6 AC
Tc = 19.12 MIN

LEGEND

- PROJECT BOUNDARY
- AES CALC ZONE BOUNDARY
- DRAINAGE BOUNDARY
- INITIAL SUBAREA
- FLOW DIRECTION
- NODE #
- SUBAREA ACREAGE — X ACRES

SCALE 1" = 200'

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PROPOSED CONDITION DRAINAGE MAP
OTAY RANCH
VILLAGE 14 & PA 16/19
PROPOSED PROJECT AMENDMENT
COUNTY OF SAN DIEGO, CALIFORNIA

SHEET 3 OF 4

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SEE MAP 3 OF 4 FOR CONTINUATION

PROCTOR VALLEY ROAD

AES CALC. ZONE 3

PROCTOR VALLEY ROAD

CROSSING J008
Q100 = 10,682 cfs

PROCTOR VALLEY ROAD

SUBJECT TO INUNDATION BY THE 100 YEAR FLOOD.

AES CALCULATION ZONE 4

PROCTOR VALLEY ROAD

PROCTOR VALLEY ROAD

Q100 = 8.12 CFS
A = 5.0 AC
Tc = 12.13 MIN

Q100 = 599.57 CFS
A = 510.3 AC
Tc = 27.67 MIN
ATT. Q100 = 531.04 CFS
Tc = 31.53 MIN

Q100 = 334.04 CFS
A = 351.8 AC
Tc = 27.62 MIN

Q100 = 19.29 CFS
A = 4.8 AC
Tc = 10.64 MIN
ATT. Q100 = 2.3 CFS
Tc = 30.72 MIN

Q50 = 161.63 CFS
A = 97.06 AC
Tc = 17.90 MIN

PER HYDROLOGY STUDY FOR ROLLING HILLS RANCH NEIGHBORHOOD 9-12 (OCTOBER 10, 2003) Q100 = 1373.90 CFS A = 718.66 AC Tc = 20.04 MIN

Q50 = 964.54 CFS
A = 557.50 AC
Tc = 20.01 MIN

PER HYDROLOGY STUDY FOR ROLLING HILLS RANCH NEIGHBORHOOD 9-12 (OCTOBER 10, 2003) Q100 = 469.76 CFS A = 261.03 AC Tc = 22.29 MIN

Q100 = 1,425.26 CFS
A = 797.9 AC
Tc = 22.42 MIN

Q100 = 470.50 CFS
A = 263.81 AC
Tc = 22.93 MIN

Q100 = 29.47 CFS
A = 6.61 AC
Tc = 10.57 MIN
ATT. Q100 = 16.4 CFS
Tc = 21.09 MIN

Q100 = 15.71 CFS
A = 3.41 AC
Tc = 9.38 MIN
ATT. Q100 = 5.2 CFS
Tc = 19.4 MIN

Q100 = 25.49 CFS
A = 14.23 AC
Tc = 10.5 MIN

Q100 = 13.91 CFS
A = 7.95 AC
Tc = 10.52 MIN

APN 598-050-20
APN 598-050-10
APN 598-050-11
APN 598-050-12
APN 598-050-13
APN 598-050-14
APN 598-050-15
APN 598-050-19
APN 598-841-18
APN 598-070-0

COUNTY OF SAN DIEGO
CITY OF CHULA VISTA

LEGEND

- PROJECT BOUNDARY
- AES CALC ZONE BOUNDARY
- DRAINAGE BOUNDARY
- INITIAL SUBAREA
- FLOW DIRECTION
- NODE #
- SUBAREA ACREAGE — X ACRES

200 0 200 400 600
SCALE 1"= 200'

PREPARED BY:

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PROPOSED CONDITION DRAINAGE MAP
OTAY RANCH
VILLAGE 14 & PA 16/19
PROPOSED PROJECT AMENDMENT
COUNTY OF SAN DIEGO, CALIFORNIA

SHEET 4 OF 4

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CHAPTER 6

Detention Analysis

Project: Basin1to10 Simulation Run: Run 1

Reservoir: BASIN-1

Start of Run:	05May2019, 00:00	Basin Model:	Basin 1
End of Run:	05May2019, 06:15	Meteorologic Model:	Met 1
Compute Time:	14Oct2019, 17:10:34	Control Specifications:	Control 1

Volume Units: IN

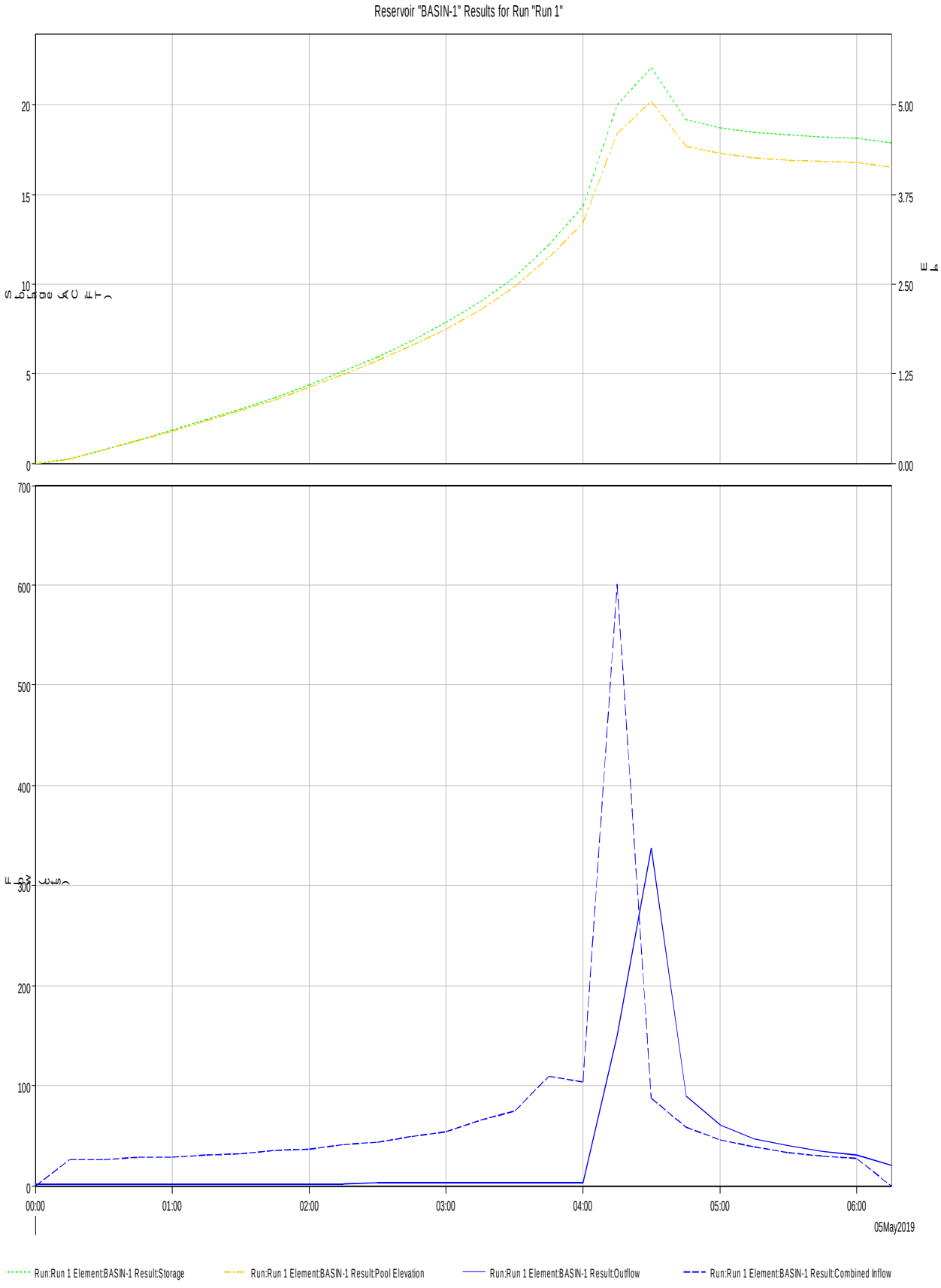
Computed Results

Peak Inflow:	601.2 (CFS)	Date/Time of Peak Inflow:	05May2019, 04:15
Peak Discharge:	337.8 (CFS)	Date/Time of Peak Discharge:	05May2019, 04:30
Inflow Volume:	1.88 (IN)	Peak Storage:	22.1 (AC-FT)
Discharge Volume:	0.92 (IN)	Peak Elevation:	5.0 (FT)

RATIONAL METHOD HYDROGRAPH PROGRAM
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RUN DATE 9/8/2019
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 15 MIN.
6 HOUR RAINFALL 3.1 INCHES
BASIN AREA 224.5 ACRES
RUNOFF COEFFICIENT 0.61
PEAK DISCHARGE 601.15 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 15	DISCHARGE (CFS) = 25.5
TIME (MIN) = 30	DISCHARGE (CFS) = 26.2
TIME (MIN) = 45	DISCHARGE (CFS) = 27.9
TIME (MIN) = 60	DISCHARGE (CFS) = 28.8
TIME (MIN) = 75	DISCHARGE (CFS) = 30.9
TIME (MIN) = 90	DISCHARGE (CFS) = 32.1
TIME (MIN) = 105	DISCHARGE (CFS) = 34.8
TIME (MIN) = 120	DISCHARGE (CFS) = 36.5
TIME (MIN) = 135	DISCHARGE (CFS) = 40.5
TIME (MIN) = 150	DISCHARGE (CFS) = 42.9
TIME (MIN) = 165	DISCHARGE (CFS) = 49.2
TIME (MIN) = 180	DISCHARGE (CFS) = 53.3
TIME (MIN) = 195	DISCHARGE (CFS) = 65.2
TIME (MIN) = 210	DISCHARGE (CFS) = 74.3
TIME (MIN) = 225	DISCHARGE (CFS) = 109
TIME (MIN) = 240	DISCHARGE (CFS) = 103.2
TIME (MIN) = 255	DISCHARGE (CFS) = 601.15
TIME (MIN) = 270	DISCHARGE (CFS) = 87.5
TIME (MIN) = 285	DISCHARGE (CFS) = 58.5
TIME (MIN) = 300	DISCHARGE (CFS) = 45.8
TIME (MIN) = 315	DISCHARGE (CFS) = 38.3
TIME (MIN) = 330	DISCHARGE (CFS) = 33.4
TIME (MIN) = 345	DISCHARGE (CFS) = 29.8
TIME (MIN) = 360	DISCHARGE (CFS) = 27
TIME (MIN) = 375	DISCHARGE (CFS) = 0


Reservoir "BASIN-1" Results for Run "Run 1"
Storage (AC-FT)
Elev (FT)
Flow (CFS)
0
5
10
15
20
0.00
1.25
2.50
3.75
5.00
0
100
200
300
400
500
600
700
00:00
01:00
02:00
03:00
04:00
05:00
06:00
05May2019
Run:Run 1 Element:BASIN-1 Result:Storage
Run:Run 1 Element:BASIN-1 Result:Pool Elevation
Run:Run 1 Element:BASIN-1 Result:Outflow
Run:Run 1 Element:BASIN-1 Result:Combined Inflow

Project: Basin1to10 Simulation Run: Run 1
Reservoir: BASIN-1

Start of Run:	05May2019, 00:00	Basin Model:	Basin 1
End of Run:	05May2019, 06:15	Meteorologic Model:	Met 1
Compute Time:	14Oct2019, 17:10:34	Control Specifications:	Control 1

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
05May2019	00:00	0.0	0.0	0.0	1.6
05May2019	00:15	25.5	0.2	0.1	1.6
05May2019	00:30	26.2	0.7	0.2	1.6
05May2019	00:45	27.9	1.3	0.3	1.6
05May2019	01:00	28.8	1.8	0.4	1.6
05May2019	01:15	30.9	2.4	0.6	1.6
05May2019	01:30	32.1	3.0	0.7	1.7
05May2019	01:45	34.8	3.7	0.9	1.9
05May2019	02:00	36.5	4.4	1.1	2.1
05May2019	02:15	40.5	5.1	1.2	2.2
05May2019	02:30	42.9	5.9	1.4	2.4
05May2019	02:45	49.2	6.8	1.6	2.5
05May2019	03:00	53.3	7.8	1.9	2.6
05May2019	03:15	65.2	9.0	2.1	2.7
05May2019	03:30	74.3	10.4	2.5	2.8
05May2019	03:45	109.0	12.2	2.9	3.0
05May2019	04:00	103.2	14.4	3.4	3.4
05May2019	04:15	601.2	20.0	4.6	150.1
05May2019	04:30	87.5	22.1	5.0	337.8
05May2019	04:45	58.5	19.2	4.4	89.9
05May2019	05:00	45.8	18.7	4.3	60.5
05May2019	05:15	38.3	18.5	4.3	47.2
05May2019	05:30	33.4	18.3	4.2	39.4
05May2019	05:45	29.8	18.2	4.2	34.2
05May2019	06:00	27.0	18.1	4.2	30.5

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
05May2019	06:15	0.0	17.9	4.1	20.3

Project: Basin1to10 Simulation Run: Run 2

Reservoir: BASIN-2

Start of Run:	05May2019, 00:00	Basin Model:	Basin 2
End of Run:	05May2019, 06:15	Meteorologic Model:	Met 1
Compute Time:	04Nov2019, 17:15:34	Control Specifications:	Control 2

Volume Units: IN

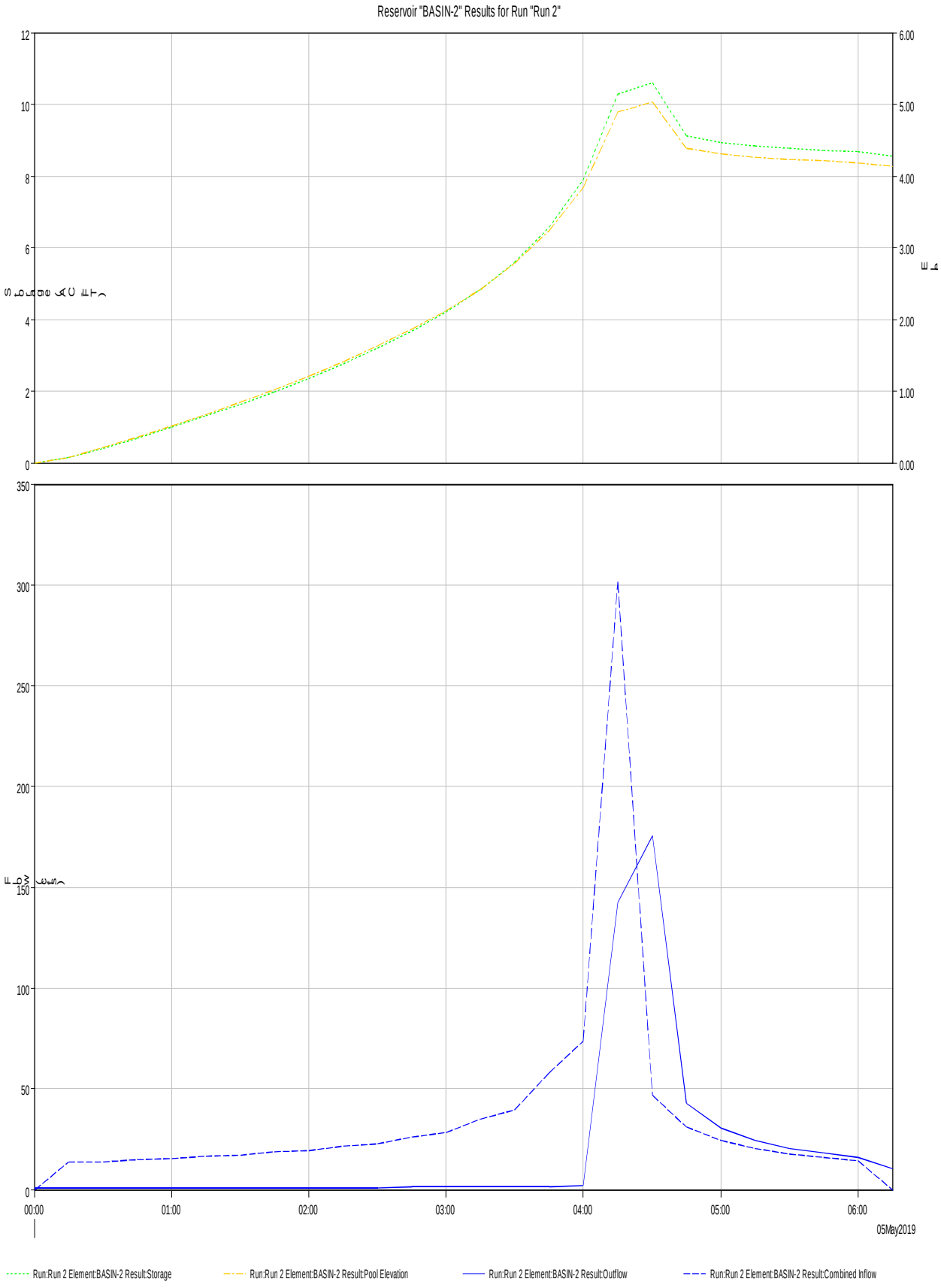
Computed Results

Peak Inflow:	301.8 (CFS)	Date/Time of Peak Inflow:	05May2019, 04:15
Peak Discharge:	175.6 (CFS)	Date/Time of Peak Discharge:	05May2019, 04:30
Inflow Volume:	1.00 (IN)	Peak Storage:	10.6 (AC-FT)
Discharge Volume:	0.55 (IN)	Peak Elevation:	5.0 (FT)

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RUN DATE 11/6/2019
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 15 MIN.
6 HOUR RAINFALL 3.1 INCHES
BASIN AREA 105.2 ACRES
RUNOFF COEFFICIENT 0.694
PEAK DISCHARGE 301.82 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 15	DISCHARGE (CFS) = 13.6
TIME (MIN) = 30	DISCHARGE (CFS) = 14
TIME (MIN) = 45	DISCHARGE (CFS) = 14.9
TIME (MIN) = 60	DISCHARGE (CFS) = 15.3
TIME (MIN) = 75	DISCHARGE (CFS) = 16.5
TIME (MIN) = 90	DISCHARGE (CFS) = 17.1
TIME (MIN) = 105	DISCHARGE (CFS) = 18.6
TIME (MIN) = 120	DISCHARGE (CFS) = 19.5
TIME (MIN) = 135	DISCHARGE (CFS) = 21.6
TIME (MIN) = 150	DISCHARGE (CFS) = 22.9
TIME (MIN) = 165	DISCHARGE (CFS) = 26.2
TIME (MIN) = 180	DISCHARGE (CFS) = 28.4
TIME (MIN) = 195	DISCHARGE (CFS) = 34.8
TIME (MIN) = 210	DISCHARGE (CFS) = 39.6
TIME (MIN) = 225	DISCHARGE (CFS) = 58.1
TIME (MIN) = 240	DISCHARGE (CFS) = 73.7
TIME (MIN) = 255	DISCHARGE (CFS) = 301.82
TIME (MIN) = 270	DISCHARGE (CFS) = 46.6
TIME (MIN) = 285	DISCHARGE (CFS) = 31.2
TIME (MIN) = 300	DISCHARGE (CFS) = 24.4
TIME (MIN) = 315	DISCHARGE (CFS) = 20.4
TIME (MIN) = 330	DISCHARGE (CFS) = 17.8
TIME (MIN) = 345	DISCHARGE (CFS) = 15.9
TIME (MIN) = 360	DISCHARGE (CFS) = 14.4
TIME (MIN) = 375	DISCHARGE (CFS) = 0


Reservoir "BASIN-2" Results for Run "Run 2"
Storage (AC-FT)
Elev (FT)
12
10
8
6
4
2
0
6.00
5.00
4.00
3.00
2.00
1.00
0.00
350
300
250
200
150
100
50
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
05May2019
Run:Run 2 Element:BASIN-2 Result:Storage
Run:Run 2 Element:BASIN-2 Result:Pool Elevation
Run:Run 2 Element:BASIN-2 Result:Outflow
Run:Run 2 Element:BASIN-2 Result:Combined Inflow

Project: Basin1to10 Simulation Run: Run 2
Reservoir: BASIN-2

Start of Run:	05May2019, 00:00	Basin Model:	Basin 2
End of Run:	05May2019, 06:15	Meteorologic Model:	Met 1
Compute Time:	04Nov2019, 17:15:34	Control Specifications:	Control 2

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
05May2019	00:00	0.0	0.0	0.0	0.7
05May2019	00:15	13.6	0.1	0.1	0.7
05May2019	00:30	14.0	0.4	0.2	0.7
05May2019	00:45	14.9	0.7	0.4	0.7
05May2019	01:00	15.3	1.0	0.5	0.7
05May2019	01:15	16.5	1.3	0.7	0.7
05May2019	01:30	17.1	1.6	0.8	0.8
05May2019	01:45	18.6	2.0	1.0	0.9
05May2019	02:00	19.5	2.4	1.2	1.0
05May2019	02:15	21.6	2.8	1.4	1.0
05May2019	02:30	22.9	3.2	1.6	1.1
05May2019	02:45	26.2	3.7	1.9	1.1
05May2019	03:00	28.4	4.2	2.1	1.2
05May2019	03:15	34.8	4.8	2.4	1.2
05May2019	03:30	39.6	5.6	2.8	1.3
05May2019	03:45	58.1	6.6	3.2	1.5
05May2019	04:00	73.7	7.9	3.8	2.2
05May2019	04:15	301.8	10.3	4.9	142.7
05May2019	04:30	46.6	10.6	5.0	175.6
05May2019	04:45	31.2	9.1	4.4	43.1
05May2019	05:00	24.4	8.9	4.3	30.8
05May2019	05:15	20.4	8.8	4.3	24.4
05May2019	05:30	17.8	8.8	4.2	20.6
05May2019	05:45	15.9	8.7	4.2	17.9
05May2019	06:00	14.4	8.7	4.2	16.1

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
05May2019	06:15	0.0	8.5	4.1	10.5

Project: Basin1to10 Simulation Run: Run 3

Reservoir: BASIN-3

Start of Run:	05May2019, 00:00	Basin Model:	Basin 3
End of Run:	05May2019, 06:10	Meteorologic Model:	Met 1
Compute Time:	14Oct2019, 17:10:35	Control Specifications:	Control 3

Volume Units: IN

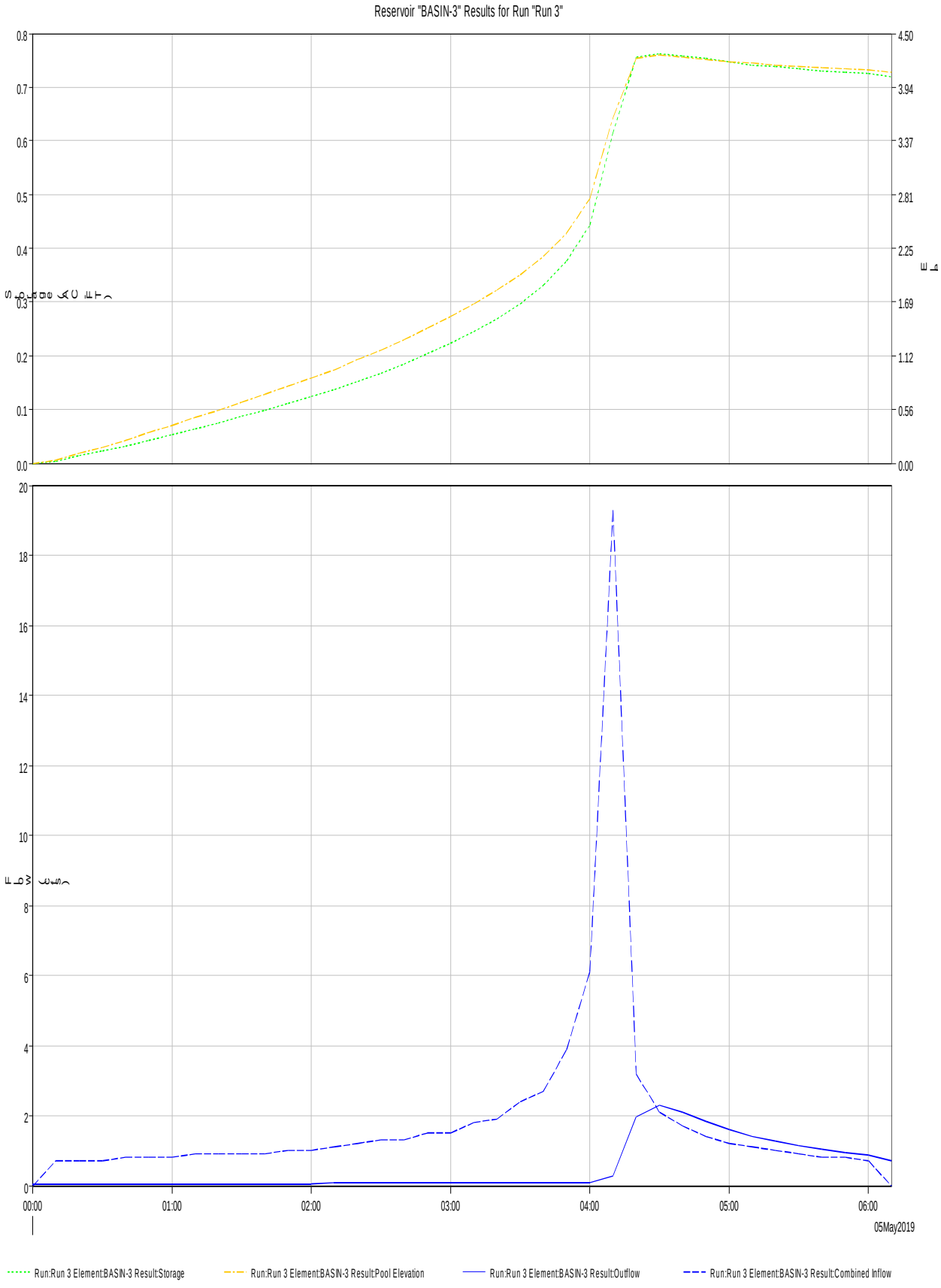
Computed Results

Peak Inflow:	19.3 (CFS)	Date/Time of Peak Inflow:	05May2019, 04:10
Peak Discharge:	2.3 (CFS)	Date/Time of Peak Discharge:	05May2019, 04:30
Inflow Volume:	0.05 (IN)	Peak Storage:	0.8 (AC-FT)
Discharge Volume:	0.01 (IN)	Peak Elevation:	4.3 (FT)

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RUN DATE 9/8/2019
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 10 MIN.
6 HOUR RAINFALL 3.1 INCHES
BASIN AREA 4.8 ACRES
RUNOFF COEFFICIENT 0.793
PEAK DISCHARGE 19.29 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 10	DISCHARGE (CFS) = 0.7
TIME (MIN) = 20	DISCHARGE (CFS) = 0.7
TIME (MIN) = 30	DISCHARGE (CFS) = 0.7
TIME (MIN) = 40	DISCHARGE (CFS) = 0.8
TIME (MIN) = 50	DISCHARGE (CFS) = 0.8
TIME (MIN) = 60	DISCHARGE (CFS) = 0.8
TIME (MIN) = 70	DISCHARGE (CFS) = 0.9
TIME (MIN) = 80	DISCHARGE (CFS) = 0.9
TIME (MIN) = 90	DISCHARGE (CFS) = 0.9
TIME (MIN) = 100	DISCHARGE (CFS) = 0.9
TIME (MIN) = 110	DISCHARGE (CFS) = 1
TIME (MIN) = 120	DISCHARGE (CFS) = 1
TIME (MIN) = 130	DISCHARGE (CFS) = 1.1
TIME (MIN) = 140	DISCHARGE (CFS) = 1.2
TIME (MIN) = 150	DISCHARGE (CFS) = 1.3
TIME (MIN) = 160	DISCHARGE (CFS) = 1.3
TIME (MIN) = 170	DISCHARGE (CFS) = 1.5
TIME (MIN) = 180	DISCHARGE (CFS) = 1.5
TIME (MIN) = 190	DISCHARGE (CFS) = 1.8
TIME (MIN) = 200	DISCHARGE (CFS) = 1.9
TIME (MIN) = 210	DISCHARGE (CFS) = 2.4
TIME (MIN) = 220	DISCHARGE (CFS) = 2.7
TIME (MIN) = 230	DISCHARGE (CFS) = 3.9
TIME (MIN) = 240	DISCHARGE (CFS) = 6.1
TIME (MIN) = 250	DISCHARGE (CFS) = 19.29
TIME (MIN) = 260	DISCHARGE (CFS) = 3.2
TIME (MIN) = 270	DISCHARGE (CFS) = 2.1
TIME (MIN) = 280	DISCHARGE (CFS) = 1.7
TIME (MIN) = 290	DISCHARGE (CFS) = 1.4
TIME (MIN) = 300	DISCHARGE (CFS) = 1.2
TIME (MIN) = 310	DISCHARGE (CFS) = 1.1
TIME (MIN) = 320	DISCHARGE (CFS) = 1
TIME (MIN) = 330	DISCHARGE (CFS) = 0.9
TIME (MIN) = 340	DISCHARGE (CFS) = 0.8
TIME (MIN) = 350	DISCHARGE (CFS) = 0.8
TIME (MIN) = 360	DISCHARGE (CFS) = 0.7
TIME (MIN) = 370	DISCHARGE (CFS) = 0


Reservoir "BASIN-3" Results for Run "Run 3"
Storage (AC-FT)
Elev (FT)
Flow (CFS)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.00
0.56
1.12
1.69
2.25
2.81
3.37
3.94
4.50
0
2
4
6
8
10
12
14
16
18
20
00:00
01:00
02:00
03:00
04:00
05:00
06:00
05May2019
Run:Run 3 Element:BASIN-3 Result:Storage
Run:Run 3 Element:BASIN-3 Result:Pool Elevation
Run:Run 3 Element:BASIN-3 Result:Outflow
Run:Run 3 Element:BASIN-3 Result:Combined Inflow

Project: Basin1to10 Simulation Run: Run 3
Reservoir: BASIN-3

Start of Run:	05May2019, 00:00	Basin Model:	Basin 3
End of Run:	05May2019, 06:10	Meteorologic Model:	Met 1
Compute Time:	14Oct2019, 17:10:35	Control Specifications:	Control 3

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
05May2019	00:00	0.0	0.0	0.0	0.0
05May2019	00:10	0.7	0.0	0.0	0.0
05May2019	00:20	0.7	0.0	0.1	0.0
05May2019	00:30	0.7	0.0	0.2	0.0
05May2019	00:40	0.8	0.0	0.2	0.0
05May2019	00:50	0.8	0.0	0.3	0.0
05May2019	01:00	0.8	0.1	0.4	0.0
05May2019	01:10	0.9	0.1	0.5	0.0
05May2019	01:20	0.9	0.1	0.6	0.1
05May2019	01:30	0.9	0.1	0.6	0.1
05May2019	01:40	0.9	0.1	0.7	0.1
05May2019	01:50	1.0	0.1	0.8	0.1
05May2019	02:00	1.0	0.1	0.9	0.1
05May2019	02:10	1.1	0.1	1.0	0.1
05May2019	02:20	1.2	0.2	1.1	0.1
05May2019	02:30	1.3	0.2	1.2	0.1
05May2019	02:40	1.3	0.2	1.3	0.1
05May2019	02:50	1.5	0.2	1.4	0.1
05May2019	03:00	1.5	0.2	1.5	0.1
05May2019	03:10	1.8	0.2	1.7	0.1
05May2019	03:20	1.9	0.3	1.8	0.1
05May2019	03:30	2.4	0.3	2.0	0.1
05May2019	03:40	2.7	0.3	2.2	0.1
05May2019	03:50	3.9	0.4	2.4	0.1
05May2019	04:00	6.1	0.4	2.8	0.1

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
05May2019	04:10	19.3	0.6	3.6	0.3
05May2019	04:20	3.2	0.8	4.2	2.0
05May2019	04:30	2.1	0.8	4.3	2.3
05May2019	04:40	1.7	0.8	4.3	2.1
05May2019	04:50	1.4	0.8	4.2	1.9
05May2019	05:00	1.2	0.7	4.2	1.6
05May2019	05:10	1.1	0.7	4.2	1.4
05May2019	05:20	1.0	0.7	4.2	1.3
05May2019	05:30	0.9	0.7	4.2	1.1
05May2019	05:40	0.8	0.7	4.1	1.0
05May2019	05:50	0.8	0.7	4.1	1.0
05May2019	06:00	0.7	0.7	4.1	0.9
05May2019	06:10	0.0	0.7	4.1	0.7

Project: Basin1to10 Simulation Run: Run 4

Reservoir: BASIN-4

Start of Run:	05May2019, 00:00	Basin Model:	Basin 4
End of Run:	05May2019, 06:10	Meteorologic Model:	Met 1
Compute Time:	14Oct2019, 17:10:35	Control Specifications:	Control 4

Volume Units: IN

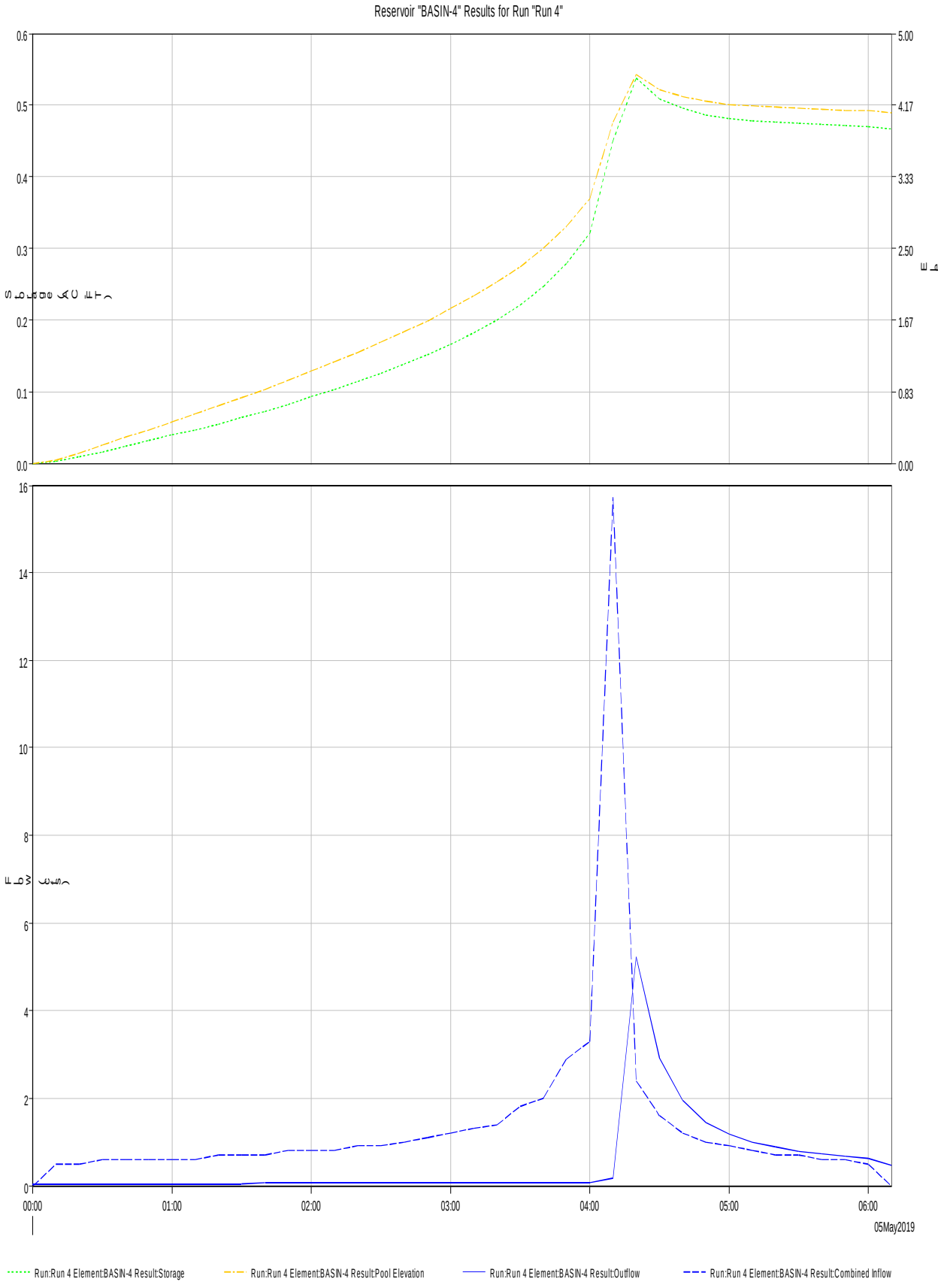
Computed Results

Peak Inflow:	15.7 (CFS)	Date/Time of Peak Inflow:	05May2019, 04:10
Peak Discharge:	5.2 (CFS)	Date/Time of Peak Discharge:	05May2019, 04:20
Inflow Volume:	0.04 (IN)	Peak Storage:	0.5 (AC-FT)
Discharge Volume:	0.01 (IN)	Peak Elevation:	4.5 (FT)

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RUN DATE 9/8/2019
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 10 MIN.
6 HOUR RAINFALL 3.1 INCHES
BASIN AREA 3.4 ACRES
RUNOFF COEFFICIENT 0.8389
PEAK DISCHARGE 15.71 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 10	DISCHARGE (CFS) = 0.5
TIME (MIN) = 20	DISCHARGE (CFS) = 0.5
TIME (MIN) = 30	DISCHARGE (CFS) = 0.6
TIME (MIN) = 40	DISCHARGE (CFS) = 0.6
TIME (MIN) = 50	DISCHARGE (CFS) = 0.6
TIME (MIN) = 60	DISCHARGE (CFS) = 0.6
TIME (MIN) = 70	DISCHARGE (CFS) = 0.6
TIME (MIN) = 80	DISCHARGE (CFS) = 0.7
TIME (MIN) = 90	DISCHARGE (CFS) = 0.7
TIME (MIN) = 100	DISCHARGE (CFS) = 0.7
TIME (MIN) = 110	DISCHARGE (CFS) = 0.8
TIME (MIN) = 120	DISCHARGE (CFS) = 0.8
TIME (MIN) = 130	DISCHARGE (CFS) = 0.8
TIME (MIN) = 140	DISCHARGE (CFS) = 0.9
TIME (MIN) = 150	DISCHARGE (CFS) = 0.9
TIME (MIN) = 160	DISCHARGE (CFS) = 1
TIME (MIN) = 170	DISCHARGE (CFS) = 1.1
TIME (MIN) = 180	DISCHARGE (CFS) = 1.2
TIME (MIN) = 190	DISCHARGE (CFS) = 1.3
TIME (MIN) = 200	DISCHARGE (CFS) = 1.4
TIME (MIN) = 210	DISCHARGE (CFS) = 1.8
TIME (MIN) = 220	DISCHARGE (CFS) = 2
TIME (MIN) = 230	DISCHARGE (CFS) = 2.9
TIME (MIN) = 240	DISCHARGE (CFS) = 3.3
TIME (MIN) = 250	DISCHARGE (CFS) = 15.71
TIME (MIN) = 260	DISCHARGE (CFS) = 2.4
TIME (MIN) = 270	DISCHARGE (CFS) = 1.6
TIME (MIN) = 280	DISCHARGE (CFS) = 1.2
TIME (MIN) = 290	DISCHARGE (CFS) = 1
TIME (MIN) = 300	DISCHARGE (CFS) = 0.9
TIME (MIN) = 310	DISCHARGE (CFS) = 0.8
TIME (MIN) = 320	DISCHARGE (CFS) = 0.7
TIME (MIN) = 330	DISCHARGE (CFS) = 0.7
TIME (MIN) = 340	DISCHARGE (CFS) = 0.6
TIME (MIN) = 350	DISCHARGE (CFS) = 0.6
TIME (MIN) = 360	DISCHARGE (CFS) = 0.5
TIME (MIN) = 370	DISCHARGE (CFS) = 0


Reservoir "BASIN-4" Results for Run "Run 4"
Storage (AC FT)
Elev (FT)
Flow (CFS)
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.00
0.83
1.67
2.50
3.33
4.17
5.00
0
2
4
6
8
10
12
14
16
00:00
01:00
02:00
03:00
04:00
05:00
06:00
05May2019
Run:Run 4 Element:BASIN-4 Result:Storage
Run:Run 4 Element:BASIN-4 Result:Pool Elevation
Run:Run 4 Element:BASIN-4 Result:Outflow
Run:Run 4 Element:BASIN-4 Result:Combined Inflow

Project: Basin1to10 Simulation Run: Run 4
Reservoir: BASIN-4

Start of Run:	05May2019, 00:00	Basin Model:	Basin 4
End of Run:	05May2019, 06:10	Meteorologic Model:	Met 1
Compute Time:	14Oct2019, 17:10:35	Control Specifications:	Control 4

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
05May2019	00:00	0.0	0.0	0.0	0.0
05May2019	00:10	0.5	0.0	0.0	0.0
05May2019	00:20	0.5	0.0	0.1	0.0
05May2019	00:30	0.6	0.0	0.2	0.0
05May2019	00:40	0.6	0.0	0.3	0.0
05May2019	00:50	0.6	0.0	0.4	0.0
05May2019	01:00	0.6	0.0	0.5	0.0
05May2019	01:10	0.6	0.0	0.6	0.0
05May2019	01:20	0.7	0.1	0.7	0.1
05May2019	01:30	0.7	0.1	0.8	0.1
05May2019	01:40	0.7	0.1	0.9	0.1
05May2019	01:50	0.8	0.1	1.0	0.1
05May2019	02:00	0.8	0.1	1.1	0.1
05May2019	02:10	0.8	0.1	1.2	0.1
05May2019	02:20	0.9	0.1	1.3	0.1
05May2019	02:30	0.9	0.1	1.4	0.1
05May2019	02:40	1.0	0.1	1.5	0.1
05May2019	02:50	1.1	0.2	1.7	0.1
05May2019	03:00	1.2	0.2	1.8	0.1
05May2019	03:10	1.3	0.2	1.9	0.1
05May2019	03:20	1.4	0.2	2.1	0.1
05May2019	03:30	1.8	0.2	2.3	0.1
05May2019	03:40	2.0	0.2	2.5	0.1
05May2019	03:50	2.9	0.3	2.8	0.1
05May2019	04:00	3.3	0.3	3.1	0.1

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
05May2019	04:10	15.7	0.5	4.0	0.2
05May2019	04:20	2.4	0.5	4.5	5.2
05May2019	04:30	1.6	0.5	4.3	2.9
05May2019	04:40	1.2	0.5	4.3	2.0
05May2019	04:50	1.0	0.5	4.2	1.4
05May2019	05:00	0.9	0.5	4.2	1.2
05May2019	05:10	0.8	0.5	4.2	1.0
05May2019	05:20	0.7	0.5	4.1	0.9
05May2019	05:30	0.7	0.5	4.1	0.8
05May2019	05:40	0.6	0.5	4.1	0.7
05May2019	05:50	0.6	0.5	4.1	0.7
05May2019	06:00	0.5	0.5	4.1	0.6
05May2019	06:10	0.0	0.5	4.1	0.5

Project: Basin1to10 Simulation Run: Run 5

Reservoir: BASIN-5

Start of Run:	05May2019, 00:00	Basin Model:	Basin 5
End of Run:	05May2019, 06:10	Meteorologic Model:	Met 1
Compute Time:	14Oct2019, 17:10:35	Control Specifications:	Control 5

Volume Units: IN

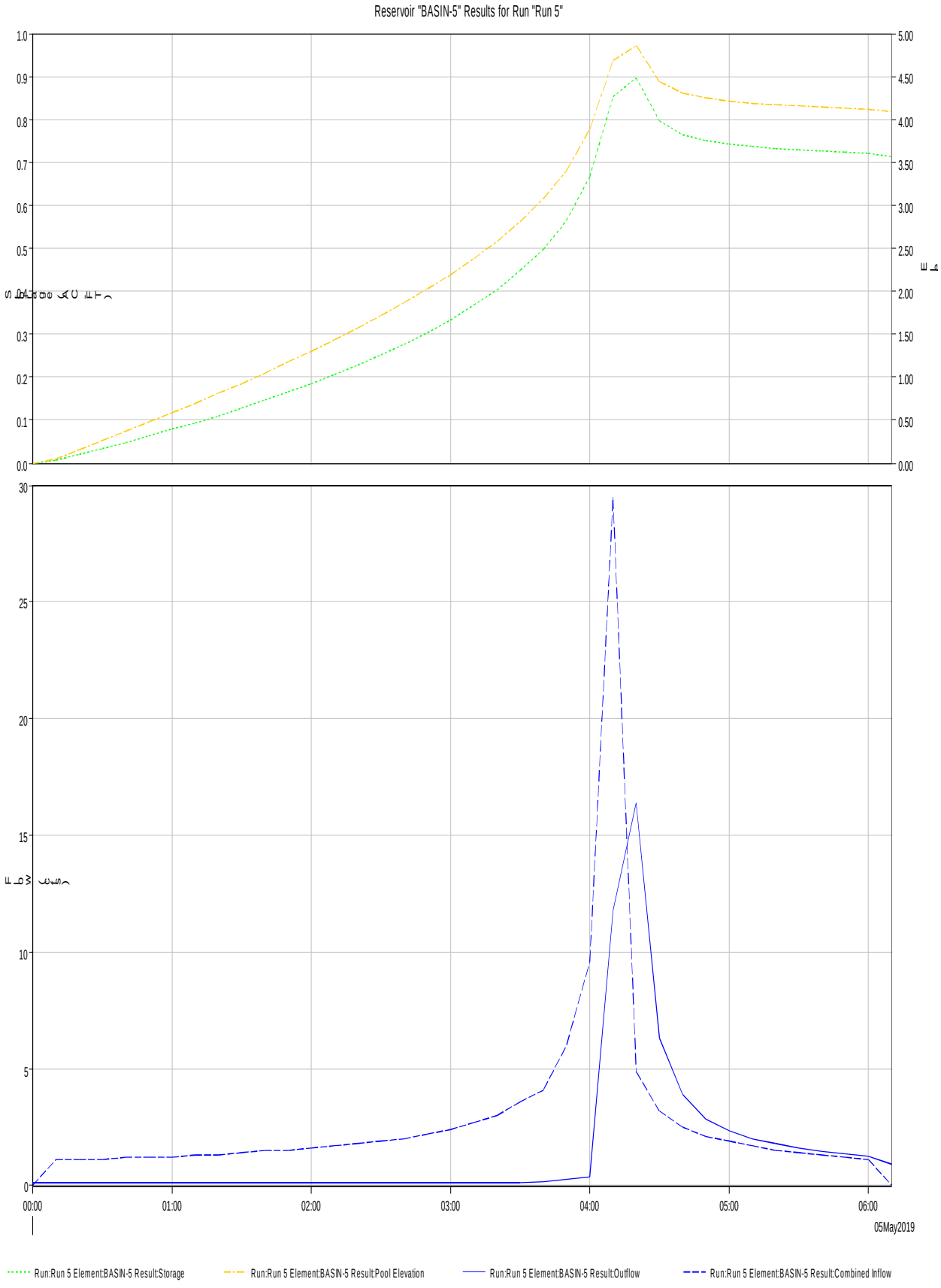
Computed Results

Peak Inflow:	29.5 (CFS)	Date/Time of Peak Inflow:	05May2019, 04:10
Peak Discharge:	16.4 (CFS)	Date/Time of Peak Discharge:	05May2019, 04:20
Inflow Volume:	0.08 (IN)	Peak Storage:	0.9 (AC-FT)
Discharge Volume:	0.04 (IN)	Peak Elevation:	4.9 (FT)

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RUN DATE 9/8/2019
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 10 MIN.
6 HOUR RAINFALL 3.1 INCHES
BASIN AREA 6.6 ACRES
RUNOFF COEFFICIENT 0.886
PEAK DISCHARGE 29.47 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 10	DISCHARGE (CFS) = 1.1
TIME (MIN) = 20	DISCHARGE (CFS) = 1.1
TIME (MIN) = 30	DISCHARGE (CFS) = 1.1
TIME (MIN) = 40	DISCHARGE (CFS) = 1.2
TIME (MIN) = 50	DISCHARGE (CFS) = 1.2
TIME (MIN) = 60	DISCHARGE (CFS) = 1.2
TIME (MIN) = 70	DISCHARGE (CFS) = 1.3
TIME (MIN) = 80	DISCHARGE (CFS) = 1.3
TIME (MIN) = 90	DISCHARGE (CFS) = 1.4
TIME (MIN) = 100	DISCHARGE (CFS) = 1.5
TIME (MIN) = 110	DISCHARGE (CFS) = 1.5
TIME (MIN) = 120	DISCHARGE (CFS) = 1.6
TIME (MIN) = 130	DISCHARGE (CFS) = 1.7
TIME (MIN) = 140	DISCHARGE (CFS) = 1.8
TIME (MIN) = 150	DISCHARGE (CFS) = 1.9
TIME (MIN) = 160	DISCHARGE (CFS) = 2
TIME (MIN) = 170	DISCHARGE (CFS) = 2.2
TIME (MIN) = 180	DISCHARGE (CFS) = 2.4
TIME (MIN) = 190	DISCHARGE (CFS) = 2.7
TIME (MIN) = 200	DISCHARGE (CFS) = 3
TIME (MIN) = 210	DISCHARGE (CFS) = 3.6
TIME (MIN) = 220	DISCHARGE (CFS) = 4.1
TIME (MIN) = 230	DISCHARGE (CFS) = 6
TIME (MIN) = 240	DISCHARGE (CFS) = 9.6
TIME (MIN) = 250	DISCHARGE (CFS) = 29.47
TIME (MIN) = 260	DISCHARGE (CFS) = 4.9
TIME (MIN) = 270	DISCHARGE (CFS) = 3.2
TIME (MIN) = 280	DISCHARGE (CFS) = 2.5
TIME (MIN) = 290	DISCHARGE (CFS) = 2.1
TIME (MIN) = 300	DISCHARGE (CFS) = 1.9
TIME (MIN) = 310	DISCHARGE (CFS) = 1.7
TIME (MIN) = 320	DISCHARGE (CFS) = 1.5
TIME (MIN) = 330	DISCHARGE (CFS) = 1.4
TIME (MIN) = 340	DISCHARGE (CFS) = 1.3
TIME (MIN) = 350	DISCHARGE (CFS) = 1.2
TIME (MIN) = 360	DISCHARGE (CFS) = 1.1
TIME (MIN) = 370	DISCHARGE (CFS) = 0


Reservoir "BASIN-5" Results for Run "Run 5"
Storage (AC-FT)
Elev (FT)
Flow (CFS)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
5.00
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
30
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
05May2019
Run:Run 5 Element:BASIN-5 Result:Storage
Run:Run 5 Element:BASIN-5 Result:Pool Elevation
Run:Run 5 Element:BASIN-5 Result:Outflow
Run:Run 5 Element:BASIN-5 Result:Combined Inflow

Project: Basin1to10 Simulation Run: Run 5
Reservoir: BASIN-5

Start of Run:	05May2019, 00:00	Basin Model:	Basin 5
End of Run:	05May2019, 06:10	Meteorologic Model:	Met 1
Compute Time:	14Oct2019, 17:10:35	Control Specifications:	Control 5

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
05May2019	00:00	0.0	0.0	0.0	0.1
05May2019	00:10	1.1	0.0	0.0	0.1
05May2019	00:20	1.1	0.0	0.2	0.1
05May2019	00:30	1.1	0.0	0.3	0.1
05May2019	00:40	1.2	0.0	0.4	0.1
05May2019	00:50	1.2	0.1	0.5	0.1
05May2019	01:00	1.2	0.1	0.6	0.1
05May2019	01:10	1.3	0.1	0.7	0.1
05May2019	01:20	1.3	0.1	0.8	0.1
05May2019	01:30	1.4	0.1	0.9	0.1
05May2019	01:40	1.5	0.1	1.0	0.1
05May2019	01:50	1.5	0.2	1.2	0.1
05May2019	02:00	1.6	0.2	1.3	0.1
05May2019	02:10	1.7	0.2	1.4	0.1
05May2019	02:20	1.8	0.2	1.6	0.1
05May2019	02:30	1.9	0.3	1.7	0.1
05May2019	02:40	2.0	0.3	1.9	0.1
05May2019	02:50	2.2	0.3	2.0	0.1
05May2019	03:00	2.4	0.3	2.2	0.1
05May2019	03:10	2.7	0.4	2.4	0.1
05May2019	03:20	3.0	0.4	2.6	0.1
05May2019	03:30	3.6	0.4	2.8	0.1
05May2019	03:40	4.1	0.5	3.1	0.2
05May2019	03:50	6.0	0.6	3.4	0.3
05May2019	04:00	9.6	0.7	3.9	0.4

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
05May2019	04:10	29.5	0.9	4.7	11.8
05May2019	04:20	4.9	0.9	4.9	16.4
05May2019	04:30	3.2	0.8	4.4	6.3
05May2019	04:40	2.5	0.8	4.3	3.9
05May2019	04:50	2.1	0.8	4.2	2.9
05May2019	05:00	1.9	0.7	4.2	2.3
05May2019	05:10	1.7	0.7	4.2	2.0
05May2019	05:20	1.5	0.7	4.2	1.8
05May2019	05:30	1.4	0.7	4.2	1.6
05May2019	05:40	1.3	0.7	4.1	1.5
05May2019	05:50	1.2	0.7	4.1	1.4
05May2019	06:00	1.1	0.7	4.1	1.3
05May2019	06:10	0.0	0.7	4.1	0.9

Project: Basin1to10 Simulation Run: Run 6

Reservoir: BASIN-6

Start of Run:	05May2019, 00:00	Basin Model:	Basin 6
End of Run:	05May2019, 06:10	Meteorologic Model:	Met 1
Compute Time:	14Oct2019, 17:10:36	Control Specifications:	Control 6

Volume Units: IN

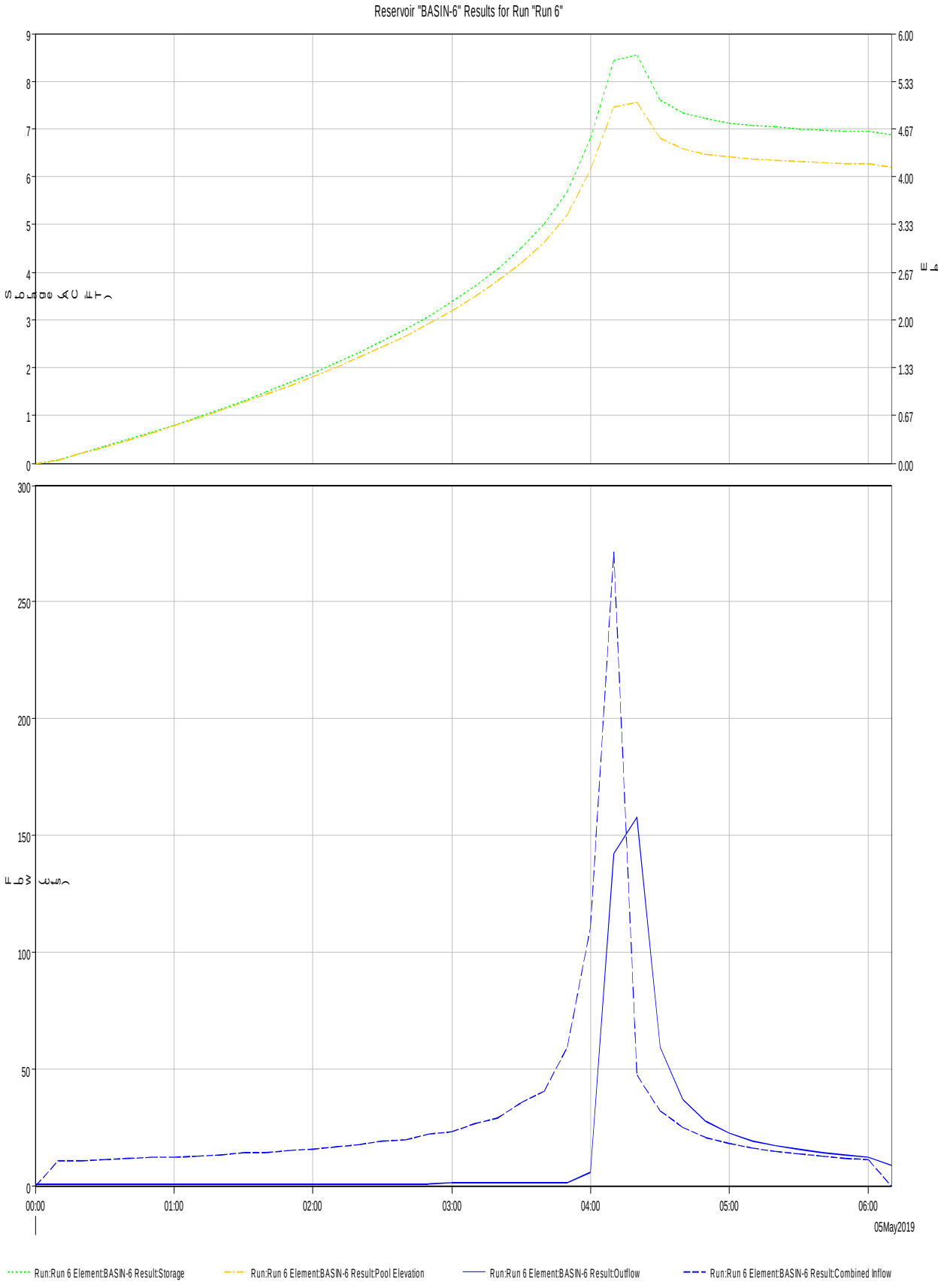
Computed Results

Peak Inflow:	271.7 (CFS)	Date/Time of Peak Inflow:	05May2019, 04:10
Peak Discharge:	157.7 (CFS)	Date/Time of Peak Discharge:	05May2019, 04:20
Inflow Volume:	0.79 (IN)	Peak Storage:	8.6 (AC-FT)
Discharge Volume:	0.42 (IN)	Peak Elevation:	5.0 (FT)

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RUN DATE 9/8/2019
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 10 MIN.
6 HOUR RAINFALL 3.1 INCHES
BASIN AREA 86 ACRES
RUNOFF COEFFICIENT 0.666
PEAK DISCHARGE 271.71 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 10	DISCHARGE (CFS) = 10.6
TIME (MIN) = 20	DISCHARGE (CFS) = 10.8
TIME (MIN) = 30	DISCHARGE (CFS) = 11.2
TIME (MIN) = 40	DISCHARGE (CFS) = 11.5
TIME (MIN) = 50	DISCHARGE (CFS) = 12
TIME (MIN) = 60	DISCHARGE (CFS) = 12.2
TIME (MIN) = 70	DISCHARGE (CFS) = 12.8
TIME (MIN) = 80	DISCHARGE (CFS) = 13.2
TIME (MIN) = 90	DISCHARGE (CFS) = 13.9
TIME (MIN) = 100	DISCHARGE (CFS) = 14.3
TIME (MIN) = 110	DISCHARGE (CFS) = 15.1
TIME (MIN) = 120	DISCHARGE (CFS) = 15.6
TIME (MIN) = 130	DISCHARGE (CFS) = 16.8
TIME (MIN) = 140	DISCHARGE (CFS) = 17.4
TIME (MIN) = 150	DISCHARGE (CFS) = 18.9
TIME (MIN) = 160	DISCHARGE (CFS) = 19.8
TIME (MIN) = 170	DISCHARGE (CFS) = 22
TIME (MIN) = 180	DISCHARGE (CFS) = 23.3
TIME (MIN) = 190	DISCHARGE (CFS) = 26.7
TIME (MIN) = 200	DISCHARGE (CFS) = 29
TIME (MIN) = 210	DISCHARGE (CFS) = 35.4
TIME (MIN) = 220	DISCHARGE (CFS) = 40.3
TIME (MIN) = 230	DISCHARGE (CFS) = 59.2
TIME (MIN) = 240	DISCHARGE (CFS) = 110.9
TIME (MIN) = 250	DISCHARGE (CFS) = 271.71
TIME (MIN) = 260	DISCHARGE (CFS) = 47.5
TIME (MIN) = 270	DISCHARGE (CFS) = 31.8
TIME (MIN) = 280	DISCHARGE (CFS) = 24.9
TIME (MIN) = 290	DISCHARGE (CFS) = 20.8
TIME (MIN) = 300	DISCHARGE (CFS) = 18.1
TIME (MIN) = 310	DISCHARGE (CFS) = 16.2
TIME (MIN) = 320	DISCHARGE (CFS) = 14.7
TIME (MIN) = 330	DISCHARGE (CFS) = 13.5
TIME (MIN) = 340	DISCHARGE (CFS) = 12.5
TIME (MIN) = 350	DISCHARGE (CFS) = 11.7
TIME (MIN) = 360	DISCHARGE (CFS) = 11
TIME (MIN) = 370	DISCHARGE (CFS) = 0


Reservoir "BASIN-6" Results for Run "Run 6"
Storage (AC-FT)
Elev (FT)
Flow (CFS)
0
1
2
3
4
5
6
7
8
9
0.00
0.67
1.33
2.00
2.67
3.33
4.00
4.67
5.33
6.00
0
50
100
150
200
250
300
00:00
01:00
02:00
03:00
04:00
05:00
06:00
05May2019
Run:Run 6 Element:BASIN-6 Result:Storage
Run:Run 6 Element:BASIN-6 Result:Pool Elevation
Run:Run 6 Element:BASIN-6 Result:Outflow
Run:Run 6 Element:BASIN-6 Result:Combined Inflow

Project: Basin1to10 Simulation Run: Run 6
Reservoir: BASIN-6

Start of Run:	05May2019, 00:00	Basin Model:	Basin 6
End of Run:	05May2019, 06:10	Meteorologic Model:	Met 1
Compute Time:	14Oct2019, 17:10:36	Control Specifications:	Control 6

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
05May2019	00:00	0.0	0.0	0.0	0.7
05May2019	00:10	10.6	0.1	0.0	0.7
05May2019	00:20	10.8	0.2	0.1	0.7
05May2019	00:30	11.2	0.3	0.2	0.7
05May2019	00:40	11.5	0.5	0.3	0.7
05May2019	00:50	12.0	0.6	0.4	0.7
05May2019	01:00	12.2	0.8	0.5	0.7
05May2019	01:10	12.8	1.0	0.6	0.7
05May2019	01:20	13.2	1.1	0.7	0.8
05May2019	01:30	13.9	1.3	0.8	0.8
05May2019	01:40	14.3	1.5	1.0	0.8
05May2019	01:50	15.1	1.7	1.1	0.9
05May2019	02:00	15.6	1.9	1.2	0.9
05May2019	02:10	16.8	2.1	1.3	0.9
05May2019	02:20	17.4	2.3	1.5	0.9
05May2019	02:30	18.9	2.5	1.6	0.9
05May2019	02:40	19.8	2.8	1.8	1.0
05May2019	02:50	22.0	3.1	1.9	1.0
05May2019	03:00	23.3	3.4	2.1	1.0
05May2019	03:10	26.7	3.7	2.3	1.0
05May2019	03:20	29.0	4.1	2.5	1.0
05May2019	03:30	35.4	4.5	2.8	1.1
05May2019	03:40	40.3	5.0	3.1	1.1
05May2019	03:50	59.2	5.7	3.5	1.3
05May2019	04:00	110.9	6.8	4.1	5.8

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
05May2019	04:10	271.7	8.4	5.0	141.8
05May2019	04:20	47.5	8.6	5.0	157.7
05May2019	04:30	31.8	7.6	4.5	59.1
05May2019	04:40	24.9	7.3	4.4	37.1
05May2019	04:50	20.8	7.2	4.3	27.7
05May2019	05:00	18.1	7.1	4.3	22.6
05May2019	05:10	16.2	7.1	4.2	19.3
05May2019	05:20	14.7	7.0	4.2	17.1
05May2019	05:30	13.5	7.0	4.2	15.4
05May2019	05:40	12.5	7.0	4.2	14.1
05May2019	05:50	11.7	7.0	4.2	13.1
05May2019	06:00	11.0	6.9	4.2	12.2
05May2019	06:10	0.0	6.9	4.1	8.9

Project: Basin1to10 Simulation Run: Run 8

Reservoir: BASIN-8

Start of Run:	05May2019, 00:00	Basin Model:	Basin 8
End of Run:	05May2019, 06:10	Meteorologic Model:	Met 1
Compute Time:	14Oct2019, 17:10:36	Control Specifications:	Control 8

Volume Units: IN

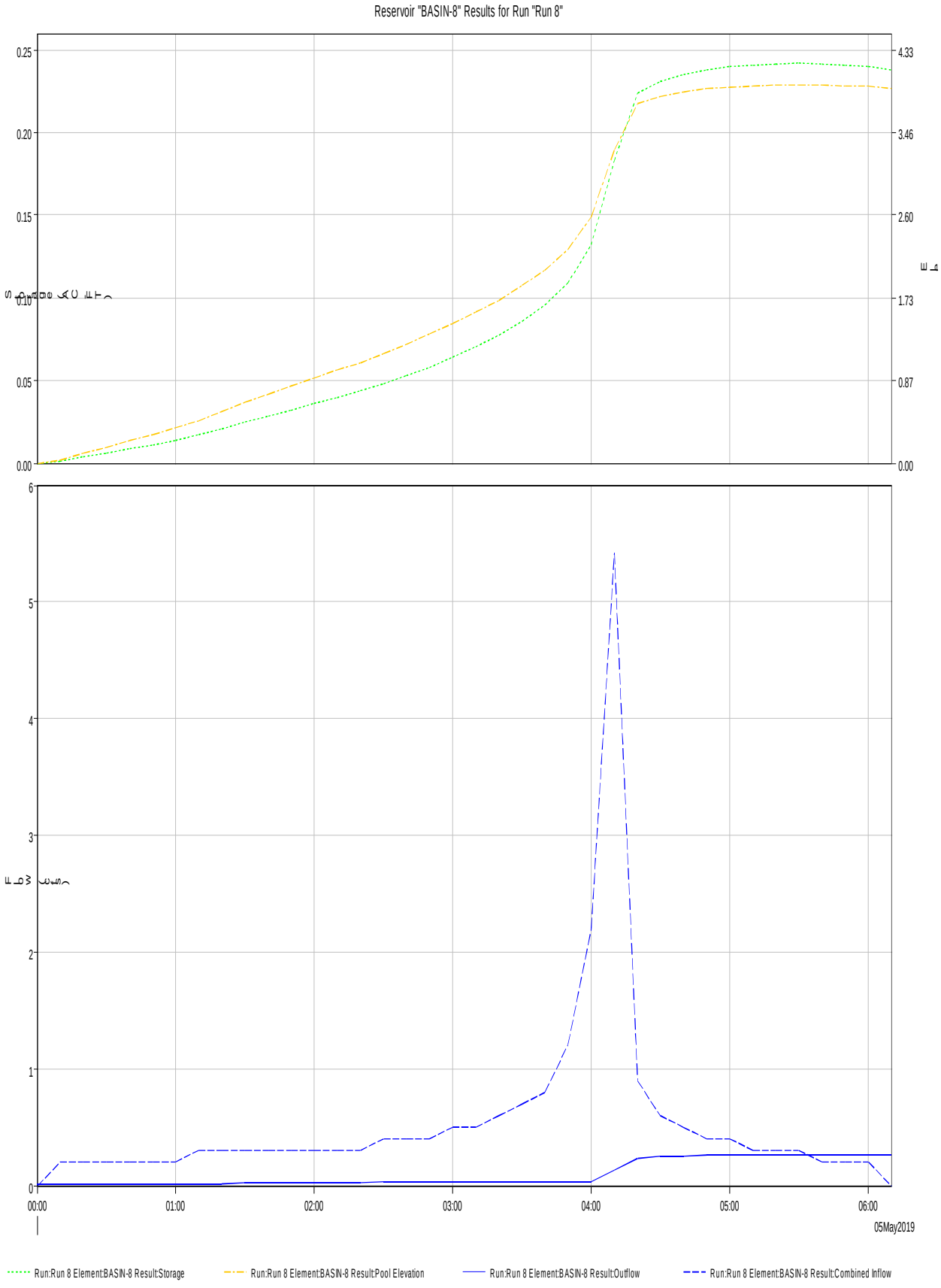
Computed Results

Peak Inflow:	5.4 (CFS)	Date/Time of Peak Inflow:	05May2019, 04:10
Peak Discharge:	0.3 (CFS)	Date/Time of Peak Discharge:	05May2019, 05:30
Inflow Volume:	0.02 (IN)	Peak Storage:	0.2 (AC-FT)
Discharge Volume:	0.00 (IN)	Peak Elevation:	4.0 (FT)

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RUN DATE 9/8/2019
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 10 MIN.
6 HOUR RAINFALL 3.1 INCHES
BASIN AREA 2.1 ACRES
RUNOFF COEFFICIENT 0.543
PEAK DISCHARGE 5.42 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 10	DISCHARGE (CFS) = 0.2
TIME (MIN) = 20	DISCHARGE (CFS) = 0.2
TIME (MIN) = 30	DISCHARGE (CFS) = 0.2
TIME (MIN) = 40	DISCHARGE (CFS) = 0.2
TIME (MIN) = 50	DISCHARGE (CFS) = 0.2
TIME (MIN) = 60	DISCHARGE (CFS) = 0.2
TIME (MIN) = 70	DISCHARGE (CFS) = 0.3
TIME (MIN) = 80	DISCHARGE (CFS) = 0.3
TIME (MIN) = 90	DISCHARGE (CFS) = 0.3
TIME (MIN) = 100	DISCHARGE (CFS) = 0.3
TIME (MIN) = 110	DISCHARGE (CFS) = 0.3
TIME (MIN) = 120	DISCHARGE (CFS) = 0.3
TIME (MIN) = 130	DISCHARGE (CFS) = 0.3
TIME (MIN) = 140	DISCHARGE (CFS) = 0.3
TIME (MIN) = 150	DISCHARGE (CFS) = 0.4
TIME (MIN) = 160	DISCHARGE (CFS) = 0.4
TIME (MIN) = 170	DISCHARGE (CFS) = 0.4
TIME (MIN) = 180	DISCHARGE (CFS) = 0.5
TIME (MIN) = 190	DISCHARGE (CFS) = 0.5
TIME (MIN) = 200	DISCHARGE (CFS) = 0.6
TIME (MIN) = 210	DISCHARGE (CFS) = 0.7
TIME (MIN) = 220	DISCHARGE (CFS) = 0.8
TIME (MIN) = 230	DISCHARGE (CFS) = 1.2
TIME (MIN) = 240	DISCHARGE (CFS) = 2.2
TIME (MIN) = 250	DISCHARGE (CFS) = 5.42
TIME (MIN) = 260	DISCHARGE (CFS) = 0.9
TIME (MIN) = 270	DISCHARGE (CFS) = 0.6
TIME (MIN) = 280	DISCHARGE (CFS) = 0.5
TIME (MIN) = 290	DISCHARGE (CFS) = 0.4
TIME (MIN) = 300	DISCHARGE (CFS) = 0.4
TIME (MIN) = 310	DISCHARGE (CFS) = 0.3
TIME (MIN) = 320	DISCHARGE (CFS) = 0.3
TIME (MIN) = 330	DISCHARGE (CFS) = 0.3
TIME (MIN) = 340	DISCHARGE (CFS) = 0.2
TIME (MIN) = 350	DISCHARGE (CFS) = 0.2
TIME (MIN) = 360	DISCHARGE (CFS) = 0.2
TIME (MIN) = 370	DISCHARGE (CFS) = 0


Reservoir "BASIN-8" Results for Run "Run 8"
Storage (AC-FT)
Elev (FT)
Flow (CFS)
0.25
0.20
0.15
0.10
0.05
0.00
4.33
3.46
2.60
1.73
0.87
0.00
6
5
4
3
2
1
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
05May2019
Run:Run 8 Element:BASIN-8 Result:Storage
Run:Run 8 Element:BASIN-8 Result:Pool Elevation
Run:Run 8 Element:BASIN-8 Result:Outflow
Run:Run 8 Element:BASIN-8 Result:Combined Inflow

Project: Basin1to10 Simulation Run: Run 8
Reservoir: BASIN-8

Start of Run:	05May2019, 00:00	Basin Model:	Basin 8
End of Run:	05May2019, 06:10	Meteorologic Model:	Met 1
Compute Time:	14Oct2019, 17:10:36	Control Specifications:	Control 8

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
05May2019	00:00	0.0	0.0	0.0	0.0
05May2019	00:10	0.2	0.0	0.0	0.0
05May2019	00:20	0.2	0.0	0.1	0.0
05May2019	00:30	0.2	0.0	0.2	0.0
05May2019	00:40	0.2	0.0	0.2	0.0
05May2019	00:50	0.2	0.0	0.3	0.0
05May2019	01:00	0.2	0.0	0.4	0.0
05May2019	01:10	0.3	0.0	0.4	0.0
05May2019	01:20	0.3	0.0	0.5	0.0
05May2019	01:30	0.3	0.0	0.6	0.0
05May2019	01:40	0.3	0.0	0.7	0.0
05May2019	01:50	0.3	0.0	0.8	0.0
05May2019	02:00	0.3	0.0	0.9	0.0
05May2019	02:10	0.3	0.0	1.0	0.0
05May2019	02:20	0.3	0.0	1.1	0.0
05May2019	02:30	0.4	0.0	1.1	0.0
05May2019	02:40	0.4	0.1	1.2	0.0
05May2019	02:50	0.4	0.1	1.3	0.0
05May2019	03:00	0.5	0.1	1.5	0.0
05May2019	03:10	0.5	0.1	1.6	0.0
05May2019	03:20	0.6	0.1	1.7	0.0
05May2019	03:30	0.7	0.1	1.9	0.0
05May2019	03:40	0.8	0.1	2.0	0.0
05May2019	03:50	1.2	0.1	2.2	0.0
05May2019	04:00	2.2	0.1	2.6	0.0

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
05May2019	04:10	5.4	0.2	3.3	0.1
05May2019	04:20	0.9	0.2	3.8	0.2
05May2019	04:30	0.6	0.2	3.8	0.2
05May2019	04:40	0.5	0.2	3.9	0.3
05May2019	04:50	0.4	0.2	3.9	0.3
05May2019	05:00	0.4	0.2	3.9	0.3
05May2019	05:10	0.3	0.2	4.0	0.3
05May2019	05:20	0.3	0.2	4.0	0.3
05May2019	05:30	0.3	0.2	4.0	0.3
05May2019	05:40	0.2	0.2	4.0	0.3
05May2019	05:50	0.2	0.2	4.0	0.3
05May2019	06:00	0.2	0.2	3.9	0.3
05May2019	06:10	0.0	0.2	3.9	0.3

Project: Basin1to10 Simulation Run: Run 10

Reservoir: BASIN-10

Start of Run:	05May2019, 00:00	Basin Model:	Basin 10
End of Run:	05May2019, 06:00	Meteorologic Model:	Met 1
Compute Time:	05Nov2019, 15:00:48	Control Specifications:	Control 10

Volume Units: IN

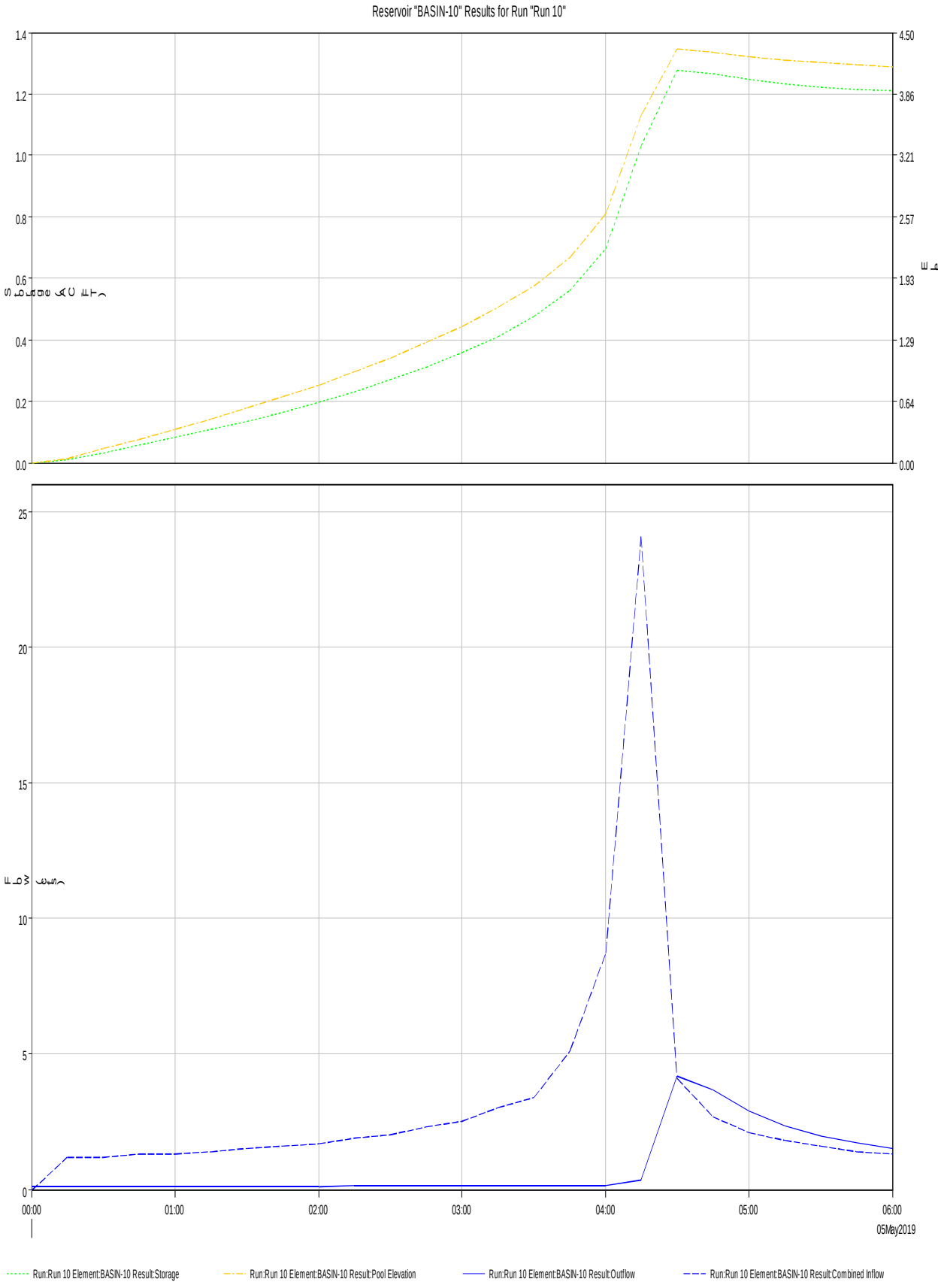
Computed Results

Peak Inflow:	24.1 (CFS)	Date/Time of Peak Inflow:	05May2019, 04:15
Peak Discharge:	4.2 (CFS)	Date/Time of Peak Discharge:	05May2019, 04:30
Inflow Volume:	0.09 (IN)	Peak Storage:	1.3 (AC-FT)
Discharge Volume:	0.02 (IN)	Peak Elevation:	4.3 (FT)

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RUN DATE 11/5/2019
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 15 MIN.
6 HOUR RAINFALL 3.1 INCHES
BASIN AREA 12.8 ACRES
RUNOFF COEFFICIENT 0.497
PEAK DISCHARGE 24.06 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 15	DISCHARGE (CFS) = 1.2
TIME (MIN) = 30	DISCHARGE (CFS) = 1.2
TIME (MIN) = 45	DISCHARGE (CFS) = 1.3
TIME (MIN) = 60	DISCHARGE (CFS) = 1.3
TIME (MIN) = 75	DISCHARGE (CFS) = 1.4
TIME (MIN) = 90	DISCHARGE (CFS) = 1.5
TIME (MIN) = 105	DISCHARGE (CFS) = 1.6
TIME (MIN) = 120	DISCHARGE (CFS) = 1.7
TIME (MIN) = 135	DISCHARGE (CFS) = 1.9
TIME (MIN) = 150	DISCHARGE (CFS) = 2
TIME (MIN) = 165	DISCHARGE (CFS) = 2.3
TIME (MIN) = 180	DISCHARGE (CFS) = 2.5
TIME (MIN) = 195	DISCHARGE (CFS) = 3
TIME (MIN) = 210	DISCHARGE (CFS) = 3.4
TIME (MIN) = 225	DISCHARGE (CFS) = 5.1
TIME (MIN) = 240	DISCHARGE (CFS) = 8.7
TIME (MIN) = 255	DISCHARGE (CFS) = 24.06
TIME (MIN) = 270	DISCHARGE (CFS) = 4.1
TIME (MIN) = 285	DISCHARGE (CFS) = 2.7
TIME (MIN) = 300	DISCHARGE (CFS) = 2.1
TIME (MIN) = 315	DISCHARGE (CFS) = 1.8
TIME (MIN) = 330	DISCHARGE (CFS) = 1.6
TIME (MIN) = 345	DISCHARGE (CFS) = 1.4
TIME (MIN) = 360	DISCHARGE (CFS) = 1.3
TIME (MIN) = 375	DISCHARGE (CFS) = 0


Reservoir "BASIN-10" Results for Run "Run 10"
Storage (AC-FT)
Elev (FT)
Flow (CFS)
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
4.50
3.86
3.21
2.57
1.93
1.29
0.64
0.00
25
20
15
10
5
0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
05May2019
Run:Run 10 Element:BASIN-10 Result:Storage
Run:Run 10 Element:BASIN-10 Result:Pool Elevation
Run:Run 10 Element:BASIN-10 Result:Outflow
Run:Run 10 Element:BASIN-10 Result:Combined Inflow

Project: Basin1to10 Simulation Run: Run 10
Reservoir: BASIN-10

Start of Run:	05May2019, 00:00	Basin Model:	Basin 10
End of Run:	05May2019, 06:00	Meteorologic Model:	Met 1
Compute Time:	05Nov2019, 14:56:45	Control Specifications:	Control 1

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
05May2019	00:00	0.0	0.0	0.0	0.1
05May2019	00:15	1.2	0.0	0.0	0.1
05May2019	00:30	1.2	0.0	0.1	0.1
05May2019	00:45	1.3	0.1	0.2	0.1
05May2019	01:00	1.3	0.1	0.3	0.1
05May2019	01:15	1.4	0.1	0.5	0.1
05May2019	01:30	1.5	0.1	0.6	0.1
05May2019	01:45	1.6	0.2	0.7	0.1
05May2019	02:00	1.7	0.2	0.8	0.1
05May2019	02:15	1.9	0.2	0.9	0.1
05May2019	02:30	2.0	0.3	1.1	0.1
05May2019	02:45	2.3	0.3	1.3	0.1
05May2019	03:00	2.5	0.4	1.4	0.1
05May2019	03:15	3.0	0.4	1.6	0.1
05May2019	03:30	3.4	0.5	1.8	0.1
05May2019	03:45	5.1	0.6	2.1	0.2
05May2019	04:00	8.7	0.7	2.6	0.2
05May2019	04:15	24.1	1.0	3.6	0.3
05May2019	04:30	4.1	1.3	4.3	4.2
05May2019	04:45	2.7	1.3	4.3	3.7
05May2019	05:00	2.1	1.2	4.2	2.9
05May2019	05:15	1.8	1.2	4.2	2.3
05May2019	05:30	1.6	1.2	4.2	2.0
05May2019	05:45	1.4	1.2	4.2	1.7
05May2019	06:00	1.3	1.2	4.1	1.5

CHAPTER 7

Preliminary Hydraulic Analysis along Proctor Valley and at Major PVR Crossings

HEC-RAS Plan: Plan 01 Profile: PF 1

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
River 3	Reach 3	3319	PF 1	1515.00	677.30	680.28	680.28	681.03	0.015712	6.94	218.38	146.26	1.00
River 3	Reach 3	3065	PF 1	1515.00	668.91	671.12	672.00	674.08	0.071886	13.81	109.72	81.72	2.10
River 3	Reach 3	2927	PF 1	1515.00	650.02	654.22	656.38	662.51	0.111299	23.09	65.60	30.32	2.77
River 3	Reach 3	2611	PF 1	1515.00	650.00	651.46	651.46	652.16	0.016284	6.70	226.01	163.98	1.01
River 3	Reach 3	2264	PF 1	1515.00	636.28	638.07	638.85	640.86	0.109080	13.40	113.05	120.92	2.44
River 3	Reach 3	1848	PF 1	1515.00	629.70	631.21	631.21	631.82	0.017123	6.26	242.11	202.40	1.01
River 3	Reach 3	1670	PF 1	1515.00	620.00	622.15	623.20	625.69	0.085711	15.11	100.29	74.64	2.30
River 3	Reach 3	1389	PF 1	1515.00	620.00	621.24	620.89	621.44	0.006186	3.58	423.78	382.46	0.60
River 3	Reach 3	1342	PF 1	1515.00	618.02	620.42	620.42	620.96	0.017591	5.89	257.18	239.81	1.00
River 3	Reach 3	1299	PF 1	1515.00	614.99	616.77	617.49	619.27	0.104436	12.67	119.59	134.72	2.37
River 3	Reach 3	1162	PF 1	1515.00	610.00	611.58	611.77	612.47	0.026103	7.57	200.01	172.29	1.24
River 3	Reach 3	840	PF 1	1515.00	602.25	609.72	603.53	609.73	0.000020	0.59	2549.67	466.74	0.04
River 3	Reach 3	700		Culvert									J006
River 3	Reach 3	639	PF 1	1515.00	596.00	600.07		600.10	0.000235	1.42	1069.82	333.01	0.14
River 3	Reach 3	165	PF 1	1515.00	598.06	599.31	599.31	599.71	0.019339	5.02	301.75	384.74	1.00
River 2	Reach 2	3247	PF 1	1466.00	905.92	908.57	908.57	909.46	0.015284	7.53	194.66	112.93	1.01
River 2	Reach 2	2989	PF 1	1466.00	900.00	900.96	901.39	902.42	0.059993	9.69	151.28	168.06	1.80
River 2	Reach 2	2916	PF 1	1466.00	893.23	895.64	896.36	897.93	0.060690	12.12	120.91	96.66	1.91
River 2	Reach 2	2797	PF 1	1466.00	890.00	893.21	893.28	894.26	0.015795	8.22	178.33	92.95	1.05
River 2	Reach 2	2735	PF 1	1466.00	890.00	892.28	892.39	893.16	0.018354	7.50	195.34	130.88	1.08
River 2	Reach 2	2675	PF 1	1466.00	890.00	890.51	890.72	891.22	0.063447	6.75	217.53	434.66	1.68
River 2	Reach 2	2583	PF 1	1466.00	882.00	890.55	883.60	890.58	0.000060	1.30	1157.79	144.38	0.08
River 2	Reach 2	2338	PF 1	1466.00	880.93	890.54	883.74	890.56	0.000078	1.13	1296.77	246.20	0.09
River 2	Reach 2	2300		Culvert									J002
River 2	Reach 2	2259	PF 1	1466.00	880.00	883.40		883.62	0.003308	3.79	387.32	200.51	0.48
River 2	Reach 2	2060	PF 1	1466.00	880.00	881.59	881.59	882.32	0.016027	6.86	213.84	148.17	1.01
River 2	Reach 2	1968	PF 1	1466.00	875.41	879.90	880.35	881.55	0.020179	10.30	142.40	63.07	1.21
River 2	Reach 2	1849	PF 1	1466.00	871.97	875.47	876.78	879.71	0.060546	16.51	88.80	44.00	2.05
River 2	Reach 2	1700	PF 1	1466.00	870.00	873.72	873.75	875.21	0.013259	9.82	149.33	51.23	1.01
River 2	Reach 2	1416	PF 1	1466.00	860.00	861.69	863.05	866.72	0.102934	18.00	81.46	53.06	2.56
River 2	Reach 2	1280	PF 1	1466.00	859.14	861.58	861.58	862.60	0.014512	8.09	181.27	90.54	1.01
River 2	Reach 2	1215	PF 1	1466.00	850.00	852.90	854.73	859.70	0.102814	20.92	70.08	36.01	2.64
River 2	Reach 2	1023	PF 1	1466.00	850.00	852.28	852.28	853.32	0.014305	8.21	178.58	86.21	1.01
River 2	Reach 2	904	PF 1	1466.00	840.00	842.42	844.16	849.08	0.113056	20.70	70.82	40.01	2.74
River 2	Reach 2	701	PF 1	1466.00	840.00	842.29	842.29	843.35	0.014248	8.26	177.57	84.68	1.01
River 2	Reach 2	638	PF 1	1466.00	835.20	841.42	838.38	841.60	0.000898	3.40	430.92	97.06	0.28
River 2	Reach 2	632	PF 1	1466.00	838.02	840.45	840.45	841.49	0.014274	8.21	178.60	86.20	1.01
River 2	Reach 2	411	PF 1	1466.00	830.00	832.05	833.05	835.31	0.054756	14.48	101.23	56.96	1.92
River 2	Reach 2	202	PF 1	1466.00	829.78	831.67	831.67	832.47	0.015567	7.17	204.33	129.38	1.01
River 2	Reach 2	176	PF 1	1466.00	828.20	829.47	830.11	831.60	0.068963	11.69	125.39	116.64	1.99
River 1	Reach 1	24310	PF 1	1536.00	900.00	902.43	901.84	902.64	0.004958	3.74	411.11	294.17	0.56
River 1	Reach 1	24036	PF 1	1536.00	900.00	902.01		902.07	0.001013	1.86	827.15	513.49	0.26
River 1	Reach 1	23714	PF 1	1536.00	899.97	901.64		901.70	0.001266	1.98	776.18	517.67	0.28
River 1	Reach 1	23355	PF 1	1536.00	896.97	900.19	900.19	900.52	0.020376	4.55	337.26	517.49	0.99
River 1	Reach 1	22932	PF 1	1536.00	890.00	892.62	890.83	892.66	0.000392	1.51	1020.58	425.05	0.17
River 1	Reach 1	22736	PF 1	1536.00	889.94	892.55		892.59	0.000375	1.50	1023.44	412.90	0.17
River 1	Reach 1	22464	PF 1	1536.00	889.69	892.33		892.42	0.001015	2.45	627.51	255.92	0.28
River 1	Reach 1	22155	PF 1	1536.00	879.94	892.37	882.45	892.38	0.000020	0.78	1978.39	224.72	0.05
River 1	Reach 1	22000		Culvert									
River 1	Reach 1	21861	PF 1	1536.00	875.00	877.82		878.47	0.010235	6.47	237.54	128.29	0.84
River 1	Reach 1	21612	PF 1	1536.00	874.97	876.86		877.01	0.002984	3.05	503.01	332.75	0.44
River 1	Reach 1	21406	PF 1	1536.00	873.47	875.33	875.33	875.63	0.021469	4.38	350.94	594.52	1.00
River 1	Reach 1	21180	PF 1	1536.00	870.00	872.75	871.14	872.82	0.000816	2.13	720.46	308.94	0.25
River 1	Reach 1	20954	PF 1	1536.00	870.00	872.33		872.51	0.002287	3.35	458.26	215.70	0.41
River 1	Reach 1	20840	PF 1	1536.00	869.36	871.25	871.25	871.88	0.017085	6.36	241.49	196.56	1.01
River 1	Reach 1	19983	PF 1	1536.00	840.00	840.85	841.37	842.62	0.083417	10.66	144.10	177.69	2.09
River 1	Reach 1	19786	PF 1	1536.00	830.00	834.22	833.46	834.74	0.005741	5.75	266.95	111.19	0.65
River 1	Reach 1	19490	PF 1	1536.00	829.38	831.24	831.24	831.87	0.017073	6.36	241.62	196.81	1.01
River 1	Reach 1	19155	PF 1	1536.00	820.00	826.18	821.72	826.20	0.000103	1.12	1375.92	328.86	0.10
River 1	Reach 1-Lower	19047	PF 1	4861.00	820.00	825.94	822.73	826.16	0.000900	3.72	1308.45	261.66	0.29
River 1	Reach 1-Lower	18819	PF 1	4861.00	820.00	824.68		825.66	0.005771	7.94	612.05	157.56	0.71
River 1	Reach 1-Lower	18727	PF 1	4861.00	820.00	824.12		825.10	0.006346	7.92	613.64	170.30	0.74
River 1	Reach 1-Lower	18611	PF 1	4861.00	820.00	822.75	822.75	824.03	0.013277	9.07	535.94	211.76	1.01
River 1	Reach 1-Lower	18458	PF 1	4861.00	811.13	814.60	816.12	819.69	0.070587	18.10	268.55	131.86	2.24
River 1	Reach 1-Lower	18192	PF 1	4861.00	810.00	814.36	813.00	814.87	0.003459	5.70	852.07	246.29	0.54
River 1	Reach 1-Lower	17825	PF 1	4861.00	807.20	811.33	811.33	812.58	0.013221	8.95	543.00	218.30	1.00
River 1	Reach 1-Lower	17495	PF 1	4861.00	800.00	802.80	803.72	805.89	0.032428	14.09	345.12	137.34	1.57
River 1	Reach 1-Lower	17409	PF 1	4861.00	798.52	802.55	802.55	804.07	0.012630	9.89	491.63	164.21	1.01
River 1	Reach 1-Lower	17368	PF 1	4861.00	792.14	796.38	798.27	802.65	0.066370	20.08	242.06	96.78	2.24
River 1	Reach 1-Lower	17243	PF 1	4861.00	790.00	793.23	794.18	796.55	0.028729	14.61	332.65	114.01	1.51
River 1	Reach 1-Lower	17156	PF 1	4861.00	784.02	789.60	790.99	793.86	0.030650	16.57	293.37	87.17	1.59
River 1	Reach 1-Lower	17045	PF 1	4861.00	774.03	777.14	779.57	787.18	0.126057	25.42	191.20	86.82	3.02
River 1	Reach 1-Lower	16895	PF 1	4861.00	768.85	771.58	772.61	774.99	0.042590	14.80	328.40	149.01	1.76
River 1	Reach 1-Lower	16732	PF 1	4861.00	759.44	763.83	765.32	768.67	0.034051	17.65	275.41	79.64	1.67
River 1	Reach 1-Lower	16531	PF 1	4861.00	750.00	752.48	754.29	758.84	0.073233	20.22	240.43	101.89	2.32
River 1	Reach 1-Lower	16351	PF 1	4861.00	740.00	743.72	745.36	749.02	0.039870	18.48	263.04	80.32	1.80
River 1	Reach 1-Lower	16245	PF 1	4861.00	739.86	744.04	744.09	745.72	0.012997	10.40	467.35	147.31	1.03
River 1	Reach 1-Lower	16061	PF 1	4861.00	730.00	731.49	733.20	739.06	0.166665	22.08	220.13	152.61	3.24
River 1	Reach 1-Lower	16020	PF 1	4861.00	730.00	732.38	733.04	734.79	0.029334	12.47	389.97	173.14	1.46
River 1	Reach 1-Lower	15890	PF 1	4861.00	720.00	725.32	726.80	730.00	0.032274	17.36	280.04	80.57	1.64
River 1	Reach 1-Lower	15787	PF 1	4861.00	720.00	726.01	725.00	727.35	0.005938	9.30	522.92	107.35	0.74
River 1	Reach 1-Lower	15664	PF 1	4861.00	719.74	724.42	724.42	726.30	0.011737	11.02	441.09	117.79	1.00

HEC-RAS Plan: Plan 01 Profile: PF 1 (Continued)

River	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
River 1	Reach 1-Lower	15521	PF 1	4861.00	710.00	711.44	713.39	721.09	0.222271	24.92	195.06	139.91	3.72
River 1	Reach 1-Lower	15274	PF 1	4861.00	700.00	705.48	704.35	706.54	0.005226	8.26	588.22	131.68	0.69
River 1	Reach 1-Lower	15175	PF 1	4861.00	700.00	705.02		706.00	0.005146	7.95	611.25	143.70	0.68
River 1	Reach 1-Lower	15057	PF 1	4861.00	699.58	703.43	703.43	705.04	0.012329	10.20	476.80	149.21	1.01
River 1	Reach 1-Lower	14985	PF 1	4861.00	691.84	696.56	698.52	702.91	0.056506	20.22	240.43	84.12	2.11
River 1	Reach 1-Lower	14904	PF 1	4861.00	690.00	695.81	696.78	699.10	0.024475	14.55	334.02	102.18	1.42
River 1	Reach 1-Lower	14751	PF 1	4861.00	690.00	695.58	694.55	696.64	0.005540	8.26	588.39	138.03	0.71
River 1	Reach 1-Lower	14643	PF 1	4861.00	690.00	695.10		696.03	0.005174	7.74	627.88	154.67	0.68
River 1	Reach 1-Lower	14531	PF 1	4861.00	690.00	694.55	693.61	695.41	0.005427	7.42	655.25	178.77	0.68
River 1	Reach 1-Lower	14343	PF 1	4861.00	690.00	692.63	692.63	693.84	0.013540	8.82	551.26	230.81	1.01
River 1	Reach 1-Lower	14040	PF 1	4861.00	680.00	686.56	684.34	687.09	0.002481	5.86	830.03	179.23	0.48
River 1	Reach 1-Lower	13834	PF 1	4861.00	680.00	685.89		686.54	0.002801	6.45	753.43	153.23	0.51
River 1	Reach 1-Lower	13742	PF 1	4861.00	680.00	684.10	684.10	685.95	0.011871	10.93	444.94	121.29	1.01
River 1	Reach 1-Lower	13586	PF 1	4861.00	670.00	673.81	676.13	681.71	0.065125	22.55	215.52	70.21	2.27
River 1	Reach 1-Lower	13367	PF 1	4861.00	670.00	676.18	674.13	676.88	0.002861	6.68	727.56	142.53	0.52
River 1	Reach 1-Lower	13246	PF 1	4861.00	670.00	674.98		676.30	0.006868	9.22	527.44	122.87	0.78
River 1	Reach 1-Lower	13134	PF 1	4861.00	669.29	673.62	673.62	675.29	0.012321	10.35	469.56	143.13	1.01
River 1	Reach 1-Lower	13050	PF 1	4861.00	660.96	665.54	667.61	672.72	0.074208	21.50	226.10	88.47	2.37
River 1	Reach 1-Lower	12844	PF 1	4861.00	660.00	665.53	665.54	667.77	0.011163	12.00	405.16	90.59	1.00
River 1	Reach 1-Lower	12686	PF 1	4861.00	660.00	665.06	663.97	666.03	0.005140	7.89	615.96	146.50	0.68
River 1	Reach 1-Lower	12614	PF 1	4861.00	660.00	664.29		665.55	0.007761	8.99	540.80	144.08	0.82
River 1	Reach 1-Lower	12559	PF 1	4861.00	660.00	663.49	663.49	665.05	0.012448	10.01	485.54	157.23	1.00
River 1	Reach 1-Lower	12500	PF 1	4861.00	651.95	656.25	658.29	663.24	0.070307	21.21	229.15	87.99	2.32
River 1	Reach 1-Lower	12446	PF 1	4861.00	650.00	652.75	654.60	659.21	0.072117	20.38	238.47	99.14	2.32
River 1	Reach 1-Lower	12387	PF 1	4861.00	650.00	653.04	653.77	655.78	0.024946	13.26	366.47	130.84	1.40
River 1	Reach 1-Lower	12288	PF 1	4861.00	645.80	650.22	651.06	653.36	0.022879	14.22	341.94	102.87	1.37
River 1	Reach 1-Lower	12103	PF 1	4861.00	640.00	646.01	646.87	649.16	0.022652	14.23	341.64	101.79	1.37
River 1	Reach 1-Lower	11930	PF 1	4861.00	640.00	644.32	643.90	645.50	0.008639	8.72	557.30	169.10	0.85
River 1	Reach 1-Lower	11618	PF 1	4861.00	636.80	640.59	640.59	641.99	0.012951	9.49	512.34	185.77	1.01
River 1	Reach 1-Lower	11488	PF 1	4861.00	630.02	636.91	637.60	639.68	0.019563	13.34	364.26	107.14	1.28
River 1	Reach 1-Lower	11264	PF 1	4861.00	630.00	635.19	634.65	636.54	0.007822	9.29	523.43	133.54	0.83
River 1	Reach 1-Lower	11012	PF 1	4861.00	630.00	634.62		635.15	0.002945	5.87	828.79	202.78	0.51
River 1	Reach 1-Lower	10831	PF 1	4861.00	629.87	632.86	632.86	634.09	0.013444	8.89	546.73	224.95	1.01
River 1	Reach 1-Lower	10719	PF 1	4861.00	620.00	622.32	624.16	629.93	0.142482	22.13	219.67	134.76	3.06
River 1	Reach 1-Lower	10561	PF 1	4861.00	620.00	625.52	622.91	625.85	0.001474	4.64	1048.35	216.80	0.37
River 1	Reach 1-Lower	10335	PF 1	4861.00	620.00	623.50	623.50	624.99	0.012612	9.81	495.58	167.45	1.01
River 1	Reach 1-Lower	10079	PF 1	4861.00	610.00	613.56	615.23	618.92	0.048758	18.58	261.68	93.16	1.95
River 1	Reach 1-Lower	9778	PF 1	4861.00	610.00	615.40	614.08	616.18	0.004399	7.11	683.92	169.74	0.62
River 1	Reach 1-Lower	9620	PF 1	4861.00	609.98	613.59	613.59	615.00	0.012885	9.51	511.02	183.41	1.00
River 1	Reach 1-Lower	9515	PF 1	4861.00	600.00	605.09	607.29	612.04	0.049981	21.15	229.88	67.93	2.03
River 1	Reach 1-Lower	9363	PF 1	4861.00	600.00	606.37	606.13	607.97	0.009821	10.14	479.52	127.34	0.92
River 1	Reach 1-Lower	9192	PF 1	4861.00	600.01	604.87	604.64	606.20	0.009933	9.27	524.46	161.19	0.91
River 1	Reach 1-Lower	9027	PF 1	4861.00	600.00	603.04	603.04	604.30	0.013300	9.01	539.79	215.76	1.00
River 1	Reach 1-Lower	8789	PF 1	4861.00	590.00	594.70	596.02	598.81	0.042348	16.27	298.81	116.58	1.79
River 1	Reach 1-Lower	8567	PF 1	4861.00	590.00	595.61	594.78	596.46	0.006135	7.37	659.21	199.11	0.71
River 1	Reach 1-Lower	8347	PF 1	4861.00	590.00	594.70		595.19	0.004613	5.63	863.62	316.49	0.60
River 1	Reach 1-Lower-Lo	7978	PF 1	8994.00	590.00	593.01	592.14	593.47	0.004389	5.41	1661.07	621.78	0.58
River 1	Reach 1-Lower-Lo	7799	PF 1	8994.00	590.00	591.94		592.44	0.007721	5.66	1589.52	850.73	0.73
River 1	Reach 1-Lower-Lo	7578	PF 1	8994.00	584.62	589.00	589.00	590.13	0.014023	8.55	1052.51	474.86	1.01
River 1	Reach 1-Lower-Lo	7398	PF 1	8994.00	580.00	584.18	584.94	586.56	0.027845	12.39	726.12	313.86	1.44
River 1	Reach 1-Lower-Lo	7191	PF 1	8994.00	580.00	584.52	583.72	585.14	0.005737	6.28	1431.26	523.81	0.67
River 1	Reach 1-Lower-Lo	6982	PF 1	8994.00	580.00	583.79		584.17	0.003319	4.91	1831.52	643.61	0.51
River 1	Reach 1-Lower-Lo	6770	PF 1	8994.00	579.38	581.89	581.89	582.81	0.014907	7.72	1164.77	640.51	1.01
River 1	Reach 1-Lower-Lo	6493	PF 1	8994.00	573.87	578.73	577.49	579.19	0.003649	5.45	1649.50	531.97	0.55
River 1	Reach 1-Lower-Lo	6203	PF 1	10431.00	570.00	575.76	575.76	577.23	0.012543	9.71	1074.45	368.06	1.00
River 1	Reach 1-Lower-Lo	5899	PF 1	10431.00	570.00	574.43	572.83	574.84	0.002690	5.15	2024.97	565.78	0.48
River 1	Reach 1-Lower-Lo	5649	PF 1	10431.00	570.00	572.39	572.39	573.48	0.013988	8.35	1249.03	582.17	1.01
River 1	Reach 1-Lower-Lo	5429	PF 1	10431.00	565.54	569.10	569.14	570.39	0.013859	9.11	1144.77	464.91	1.02
River 1	Reach 1-Lower-Lo	5177	PF 1	10431.00	560.00	565.72	565.22	566.63	0.007386	7.65	1364.39	449.17	0.77
River 1	Reach 1-Lower-Lo	4852	PF 1	10431.00	560.00	564.22		564.87	0.003834	6.44	1619.14	419.86	0.58
River 1	Reach 1-Lower-Lo	4737	PF 1	10431.00	559.00	564.21	561.86	564.49	0.001533	4.23	2466.77	607.50	0.37
River 1	Reach 1-Lower-Lo	4700		Bridge									J008
River 1	Reach 1-Lower-Lo	4603	PF 1	10431.00	559.00	563.76		564.13	0.002857	4.89	2134.29	674.80	0.48
River 1	Reach 1-Lower-Lo	4401	PF 1	10431.00	560.01	563.21		563.54	0.002849	4.63	2253.59	771.79	0.48
River 1	Reach 1-Lower-Lo	4159	PF 1	10431.00	556.73	561.24	561.24	562.16	0.014651	7.71	1353.68	736.94	1.00
River 1	Reach 1-Lower-Lo	3959	PF 1	10431.00	550.00	555.97	556.62	558.30	0.024337	12.25	851.67	338.18	1.36
River 1	Reach 1-Lower-Lo	3731	PF 1	10431.00	550.00	554.67	554.67	556.08	0.012667	9.51	1096.97	390.55	1.00
River 1	Reach 1-Lower-Lo	3414	PF 1	10431.00	550.00	553.85	552.27	554.16	0.002274	4.52	2306.78	690.80	0.44
River 1	Reach 1-Lower-Lo	3233	PF 1	10431.00	550.00	553.33		553.69	0.002984	4.80	2174.82	730.95	0.49
River 1	Reach 1-Lower-Lo	3091	PF 1	10431.00	550.00	552.49		553.06	0.006686	6.08	1714.61	738.84	0.70
River 1	Reach 1-Lower-Lo	2861	PF 1	10431.00	546.97	549.87	549.87	550.81	0.014888	7.77	1342.06	730.18	1.01
River 1	Reach 1-Lower-Lo	2655	PF 1	10431.00	542.59	546.06	546.26	547.46	0.017454	9.50	1098.18	498.25	1.13
River 1	Reach 1-Lower-Lo	2394	PF 1	10431.00	540.00	545.08	543.92	545.60	0.004053	5.80	1799.80	573.03	0.58
River 1	Reach 1-Lower-Lo	2093	PF 1	10431.00	540.00	544.85		545.01	0.000859	3.27	3193.41	750.81	0.28
River 1	Reach 1-Lower-Lo	1791	PF 1	10431.00	540.00	544.43		544.68	0.001407	4.00	2607.32	654.36	0.35
River 1	Reach 1-Lower-Lo	1514	PF 1	10431.00	540.00	543.53		544.04	0.003844	5.77	1809.23	557.58	0.56
River 1	Reach 1-Lower-Lo	1244	PF 1	10431.00	538.75	541.36	541.36	542.16	0.015846	7.13	1462.67	948.52	1.01
River 1	Reach 1-Lower-Lo	930	PF 1	10431.00	530.00	534.84	532.94	535.09	0.001696	4.04	2581.16	733.45	0.38
River 1	Reach 1-Lower-Lo	726	PF 1	10431.00	530.00	534.55		534.78	0.001296	3.82	2727.82	687.38	0.34
River 1	Reach 1-Lower-Lo	355	PF 1	10431.00	530.00	532.70	532.46	533.66	0.010018	7.88	1324.15	523.12	0.87

Plan: Plan 01 River 1 Reach 1 RS: 22000 Culv Group: J001 Profile: PF 1

Q Culv Group (cfs)	1536.00	Culv Full Len (ft)	200.00
# Barrels	3	Culv Vel US (ft/s)	12.80
Q Barrel (cfs)	512.00	Culv Vel DS (ft/s)	12.80
E.G. US. (ft)	892.38	Culv Inv El Up (ft)	884.00
W.S. US. (ft)	892.37	Culv Inv El Dn (ft)	883.00
E.G. DS (ft)	878.47	Culv Frctn Ls (ft)	1.56
W.S. DS (ft)	877.82	Culv Exit Loss (ft)	11.07
Delta EG (ft)	13.91	Culv Entr Loss (ft)	1.27
Delta WS (ft)	14.55	Q Weir (cfs)	
E.G. IC (ft)	893.12	Weir Sta Lft (ft)	
E.G. OC (ft)	892.38	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	888.00	Weir Max Depth (ft)	
Culv WS Outlet (ft)	887.00	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	3.79	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	4.00	Min El Weir Flow (ft)	896.38

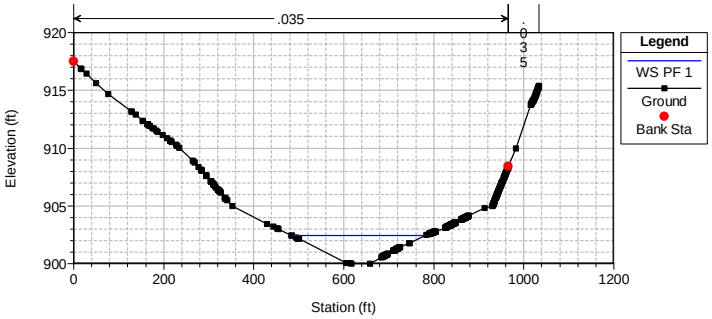
Plan: Plan 01 River 2 Reach 2 RS: 2300 Culv Group: J002 Profile: PF 1

Q Culv Group (cfs)	1466.00	Culv Full Len (ft)	
# Barrels	1	Culv Vel US (ft/s)	13.32
Q Barrel (cfs)	1466.00	Culv Vel DS (ft/s)	13.98
E.G. US. (ft)	890.56	Culv Inv El Up (ft)	881.00
W.S. US. (ft)	890.54	Culv Inv El Dn (ft)	880.00
E.G. DS (ft)	883.62	Culv Frctn Ls (ft)	1.03
W.S. DS (ft)	883.40	Culv Exit Loss (ft)	4.53
Delta EG (ft)	6.94	Culv Entr Loss (ft)	1.38
Delta WS (ft)	7.14	Q Weir (cfs)	
E.G. IC (ft)	890.08	Weir Sta Lft (ft)	
E.G. OC (ft)	890.56	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	886.42	Weir Max Depth (ft)	
Culv WS Outlet (ft)	885.12	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	5.42	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	5.12	Min El Weir Flow (ft)	904.05

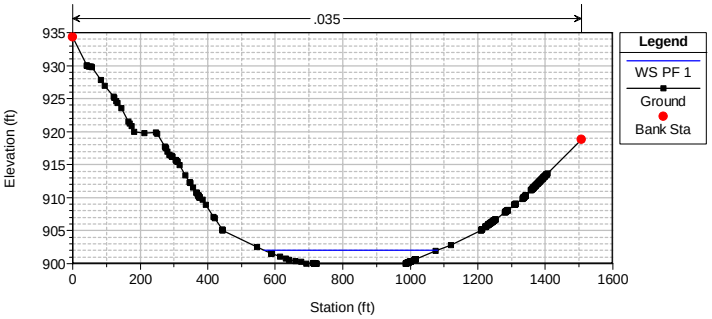
Plan: Plan 01 River 1 Reach 1-Lower-Lo RS: 4700 Profile: PF 1

E.G. US. (ft)	564.49	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	564.21	E.G. Elev (ft)	564.43	564.26
Q Total (cfs)	10431.00	W.S. Elev (ft)	564.08	563.79
Q Bridge (cfs)	10431.00	Crit W.S. (ft)	561.91	562.20
Q Weir (cfs)		Max Chl Dpth (ft)	5.08	4.79
Weir Sta Lft (ft)		Vel Total (ft/s)	4.79	5.49
Weir Sta Rgt (ft)		Flow Area (sq ft)	2177.74	1899.60
Weir Submerg		Froude # Chl	0.40	0.50
Weir Max Depth (ft)		Specif Force (cu ft)	6723.75	5886.27
Min El Weir Flow (ft)	579.01	Hydr Depth (ft)	4.36	3.82
Min El Prs (ft)	575.45	W.P. Total (ft)	519.96	516.48
Delta EG (ft)	0.36	Conv. Total (cfs)	240230.1	192160.0
Delta WS (ft)	0.45	Top Width (ft)	499.11	497.60
BR Open Area (sq ft)	6725.85	Frctn Loss (ft)	0.16	0.10
BR Open Vel (ft/s)	5.49	C & E Loss (ft)	0.01	0.03
BR Sluice Coef		Shear Total (lb/sq ft)	0.49	0.68
BR Sel Method	Energy only	Power Total (lb/ft s)	2.36	3.72

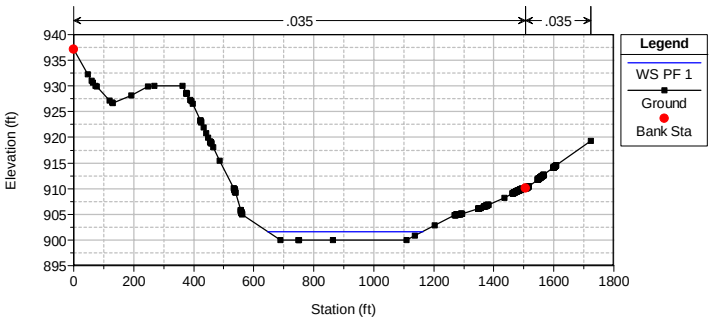
HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1 RS = 24310



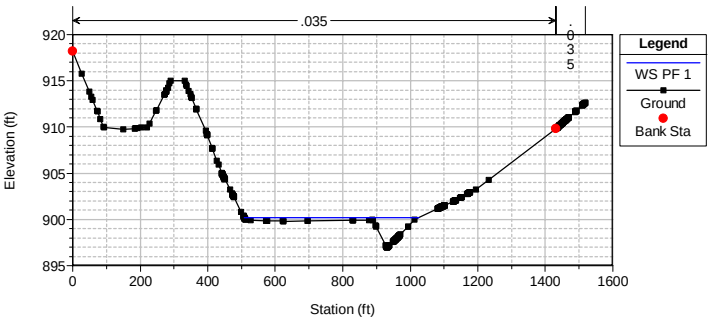
HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1 RS = 24036



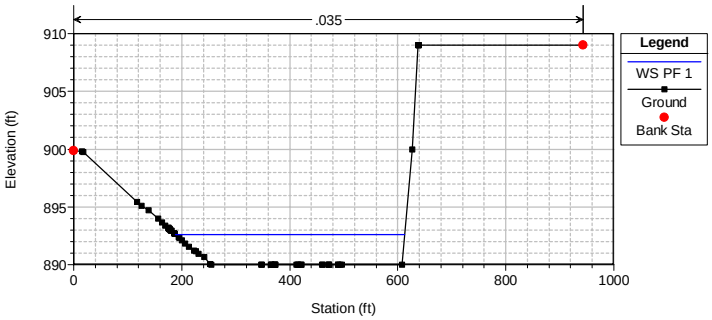
HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1 RS = 23714



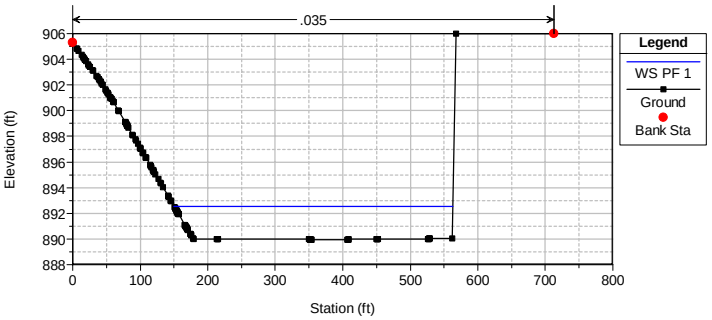
HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1 RS = 23355



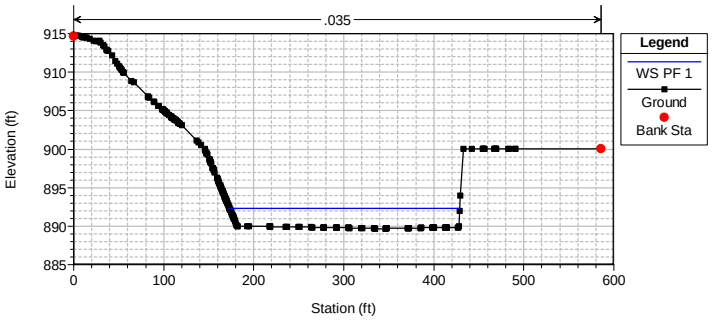
HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1 RS = 22932



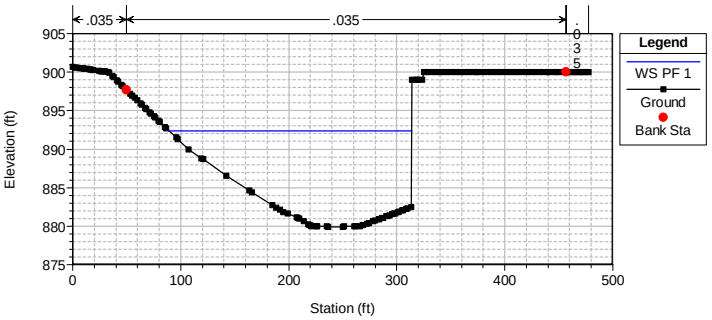
HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1 RS = 22736



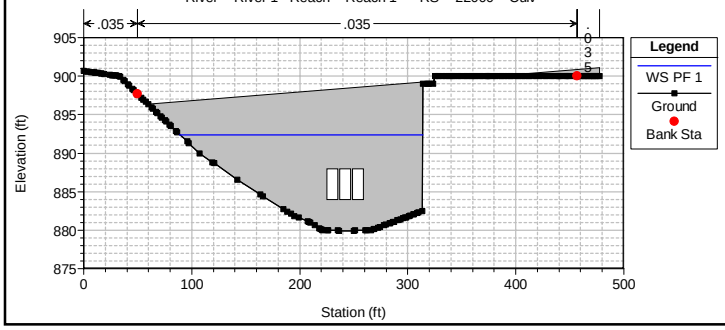
HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1 RS = 22464



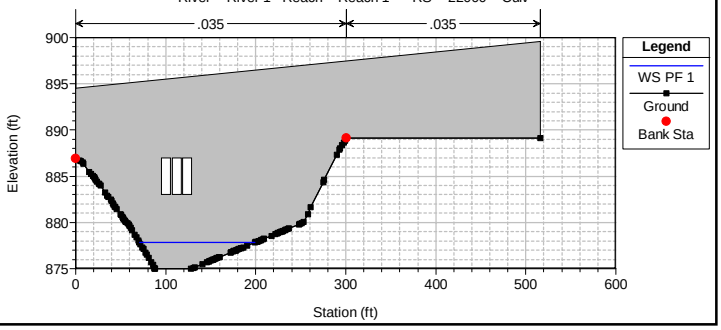
HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1 RS = 22155

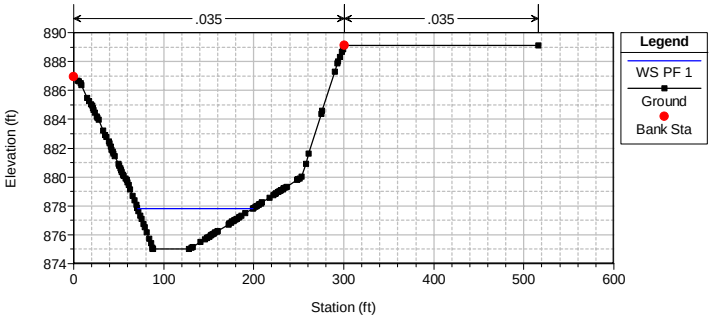


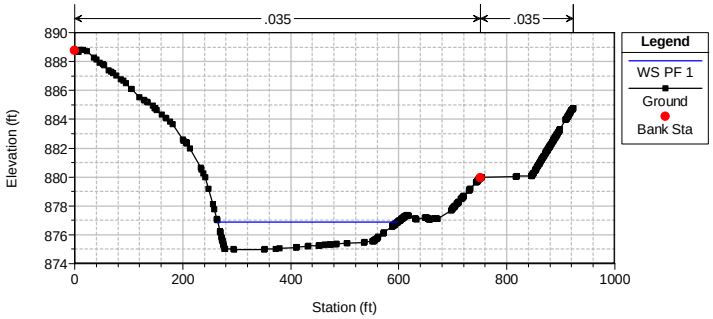
HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1 RS = 22000 Culv

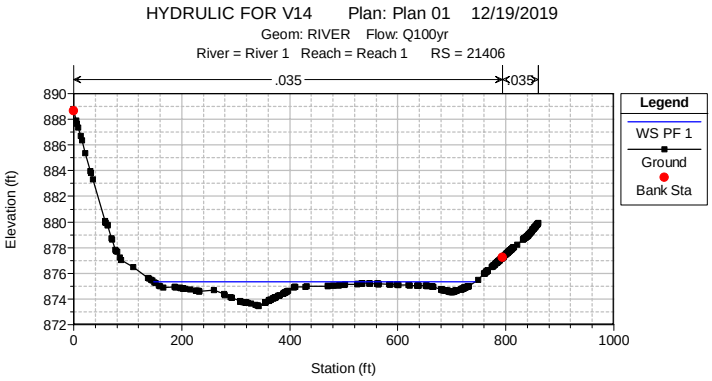


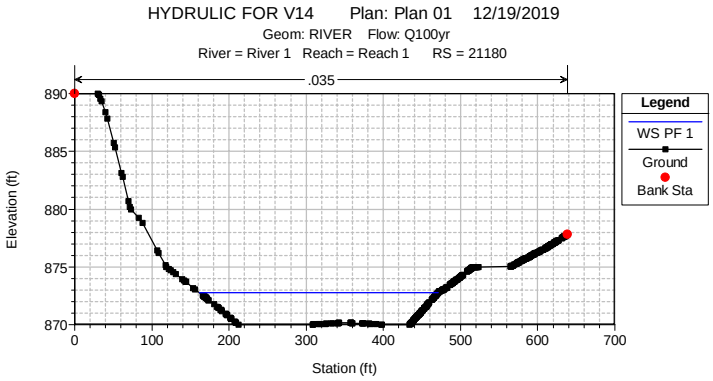
HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1 RS = 22000 Culv

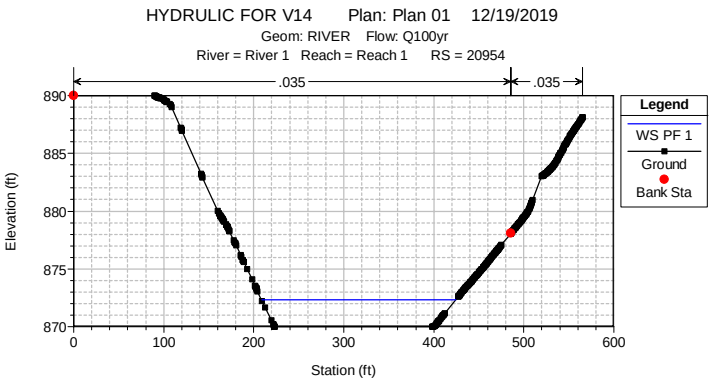


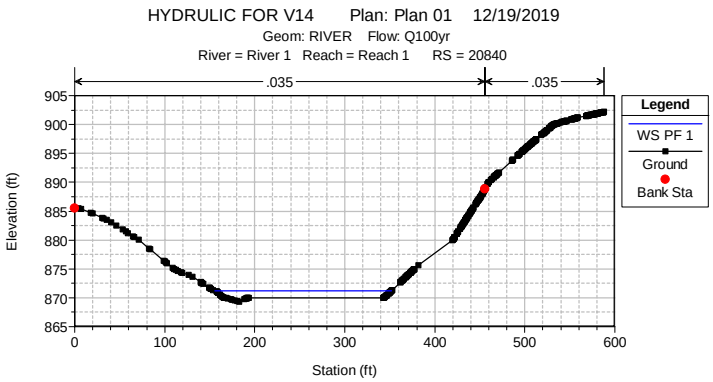

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1 RS = 21861
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

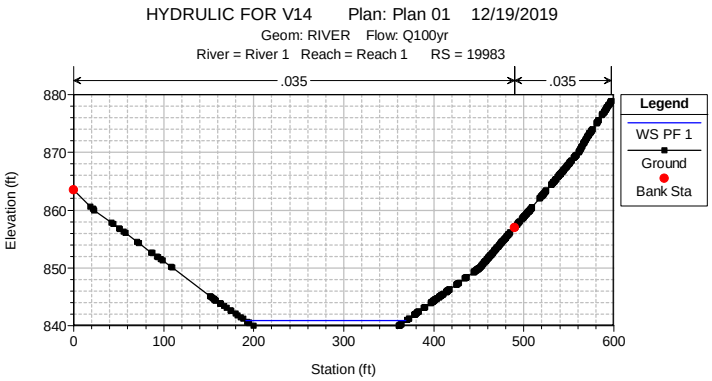

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1 RS = 21612
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

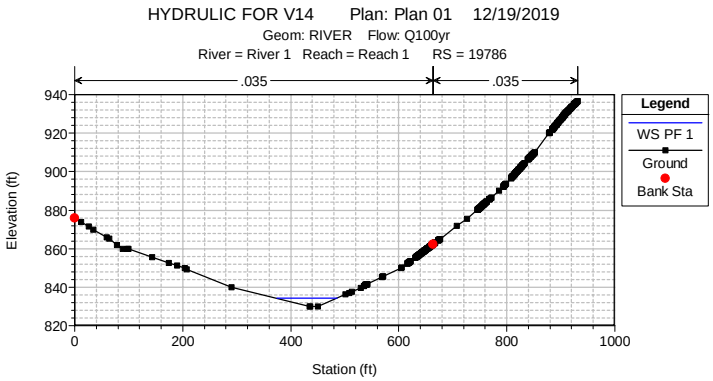

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1 RS = 21406
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

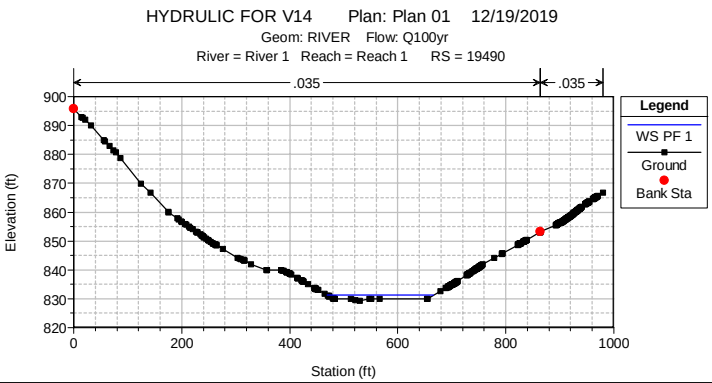

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1 RS = 21180
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

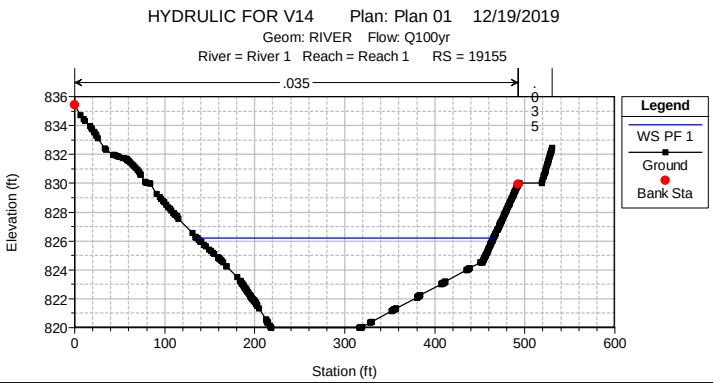

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1 RS = 20954
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

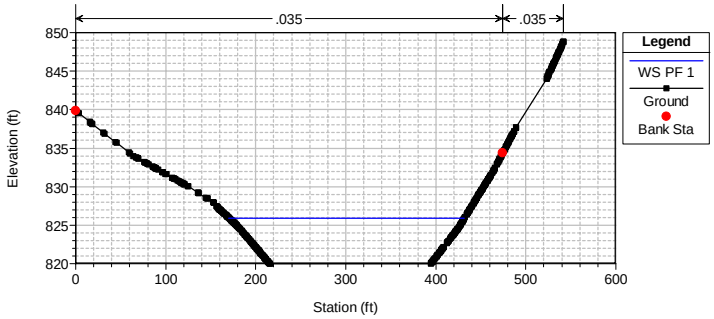

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1 RS = 20840
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

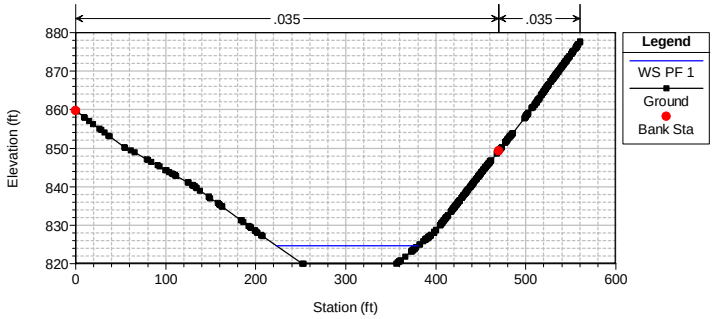

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1 RS = 19983
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

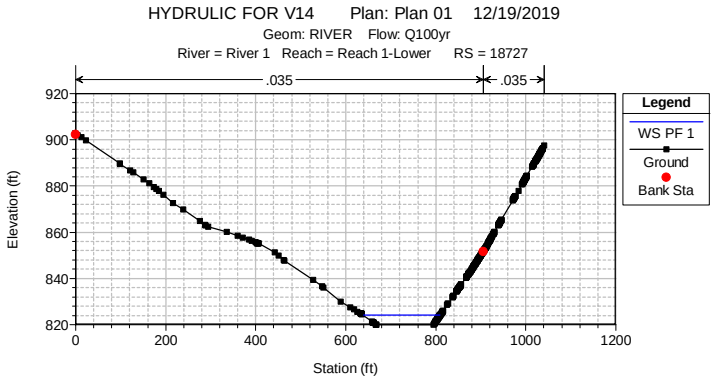

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1 RS = 19786
.035
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Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

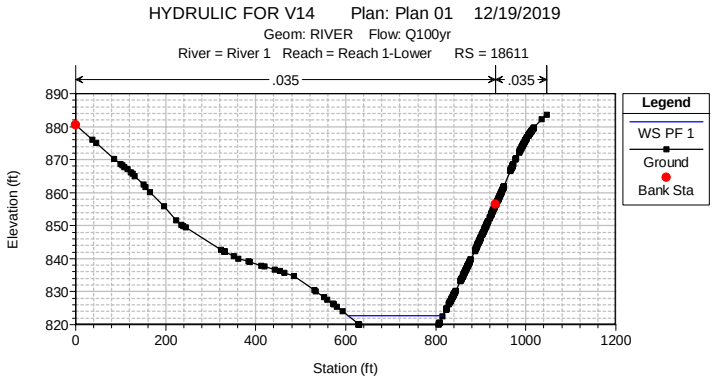

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1 RS = 19490
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

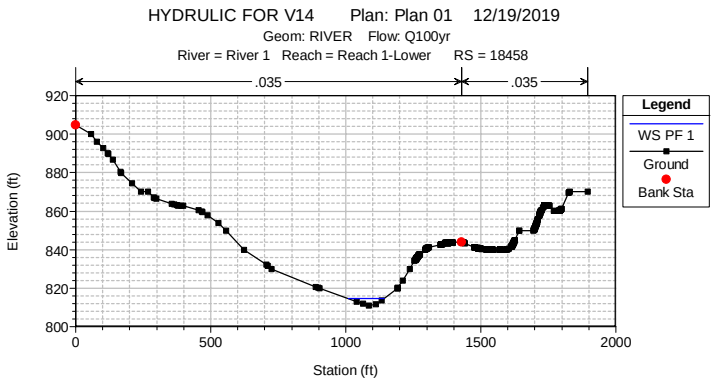

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1 RS = 19155
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

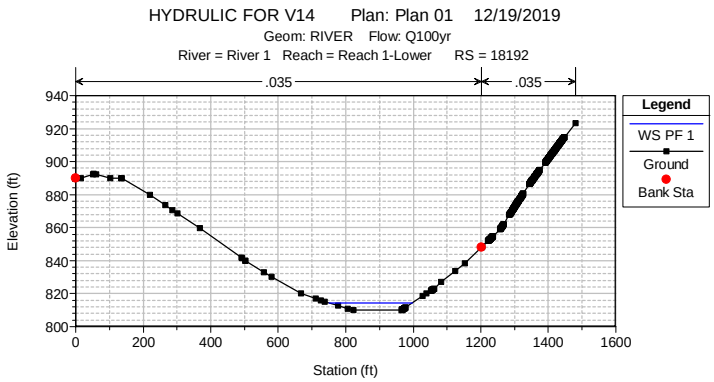

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 19047
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

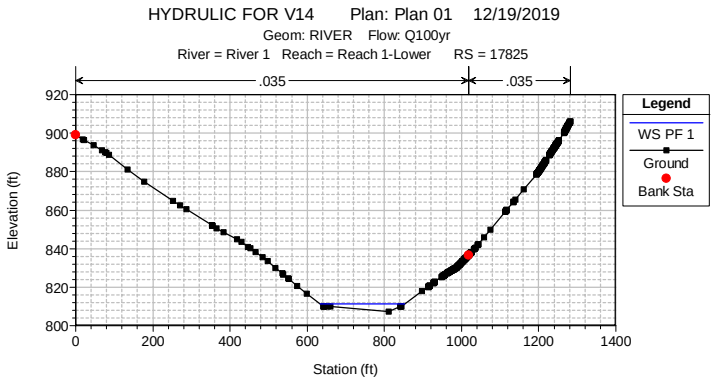

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 18819
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

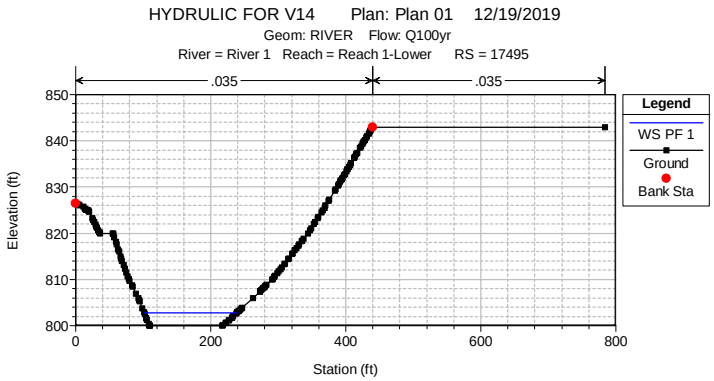

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 18727
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

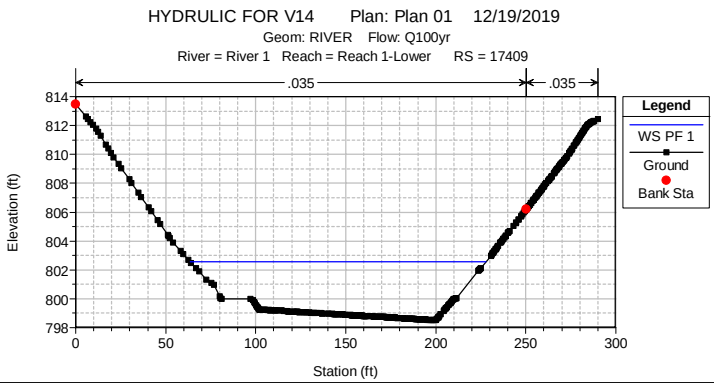

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 18611
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

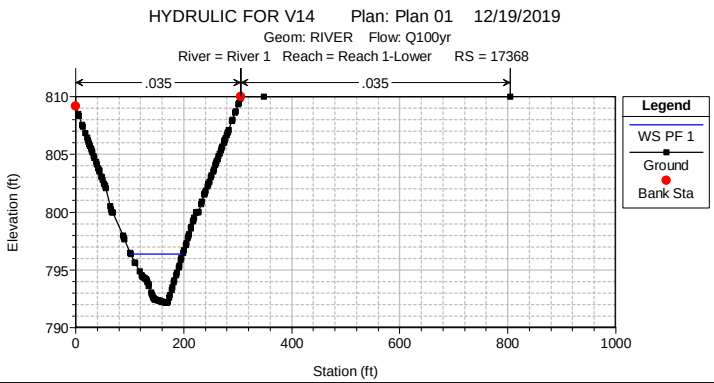

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 18458
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

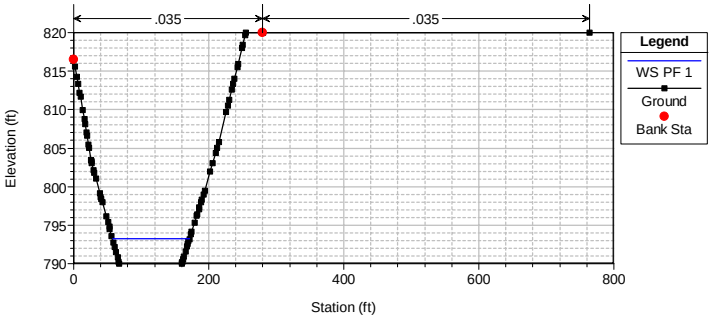

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 18192
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

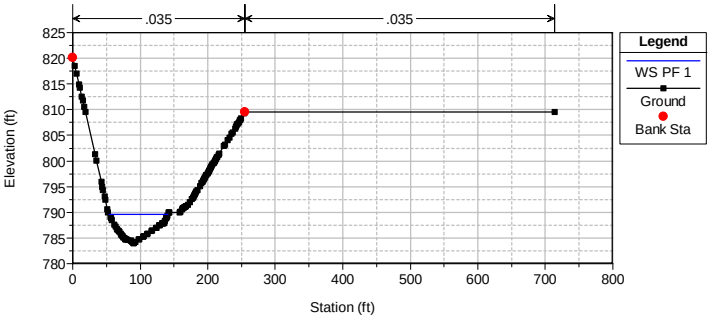

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 17825
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

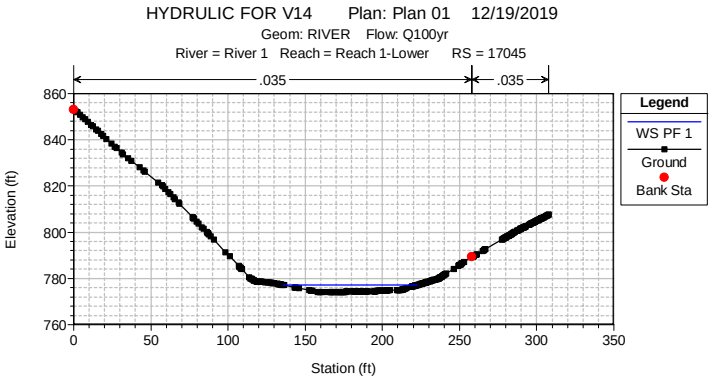

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 17495
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

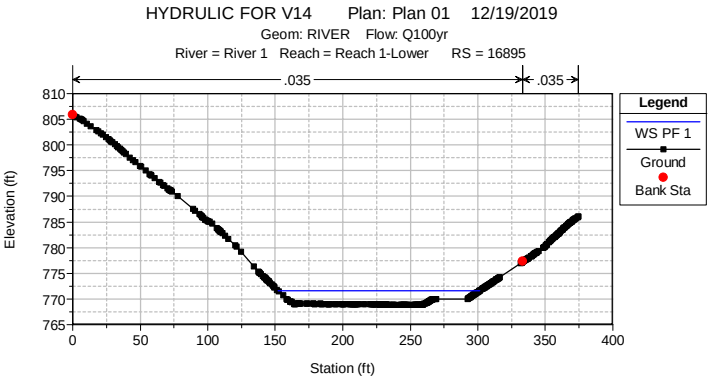

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 17409
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

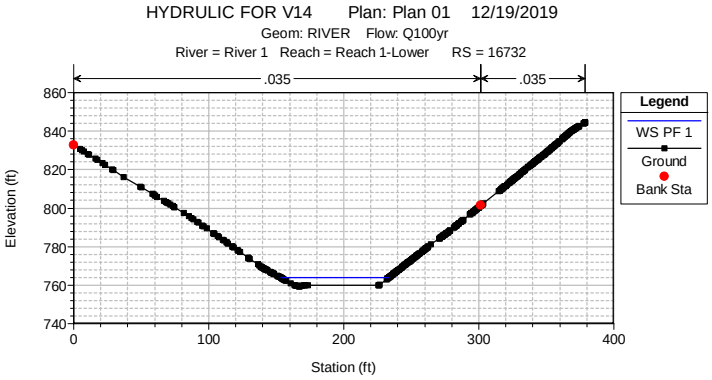

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 17368
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

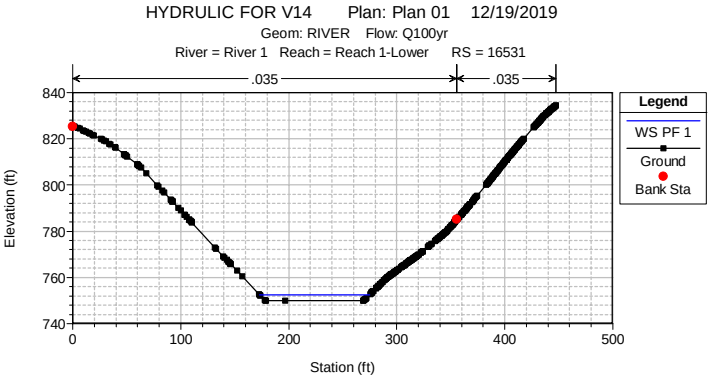

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 17243
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

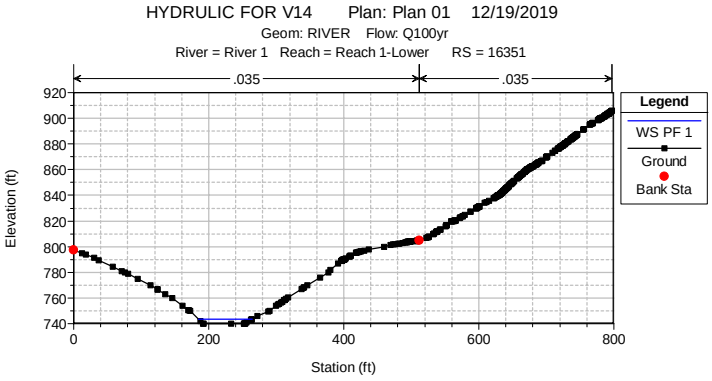

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 17156
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

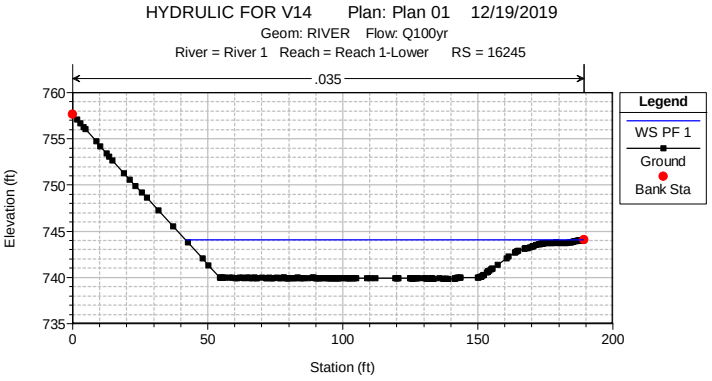

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 17045
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

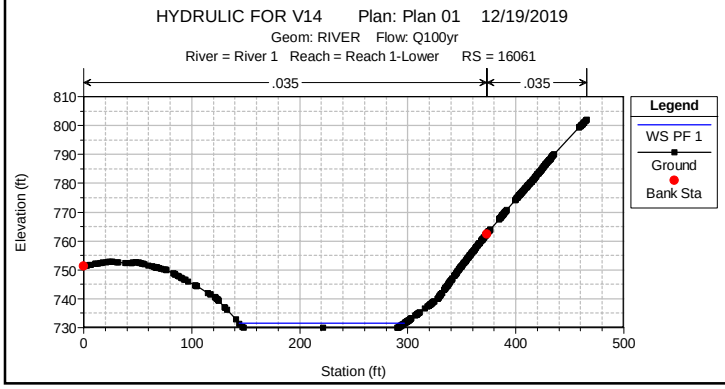

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 16895
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

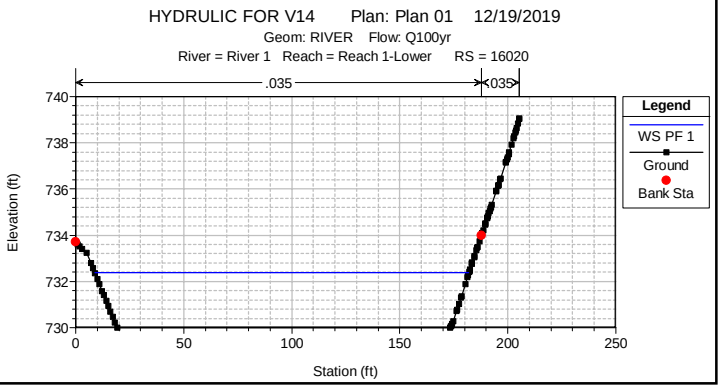

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 16732
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 16531
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

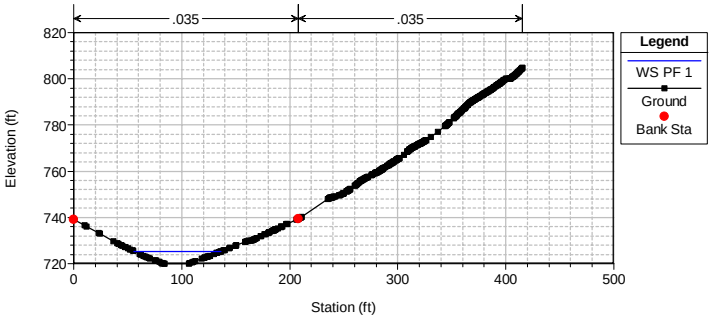

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 16351
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 16245
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

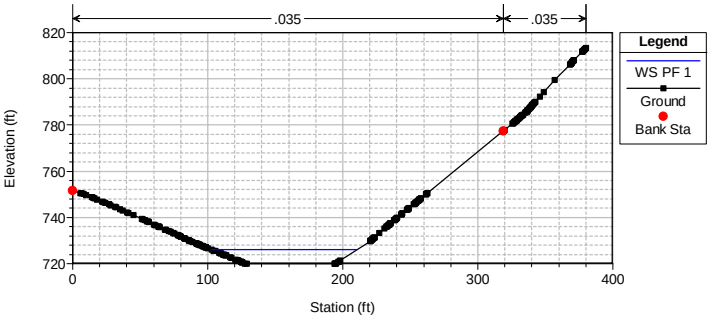

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 16061
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 16020
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

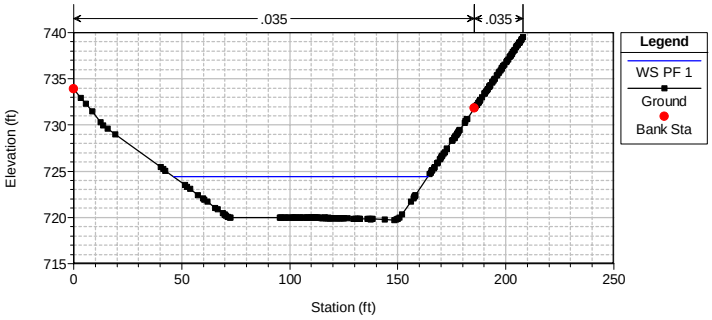
HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 15890



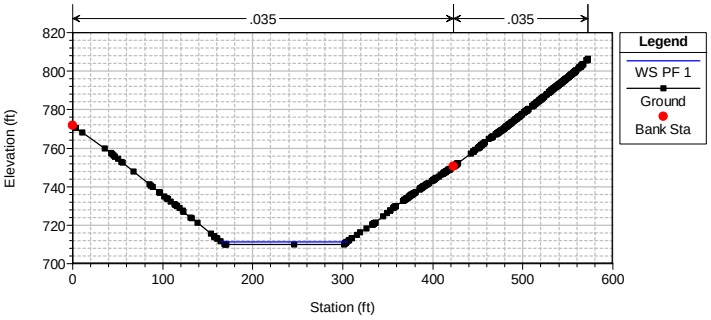
HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 15787



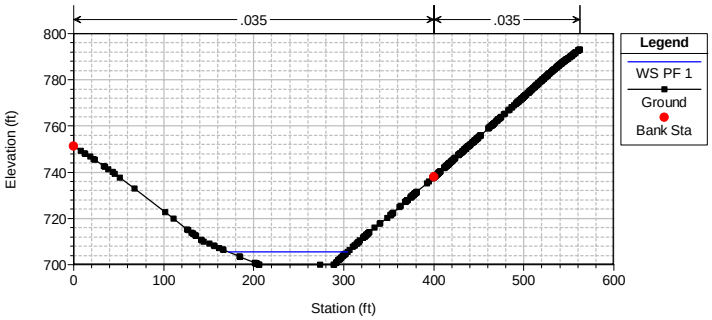
HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 15664



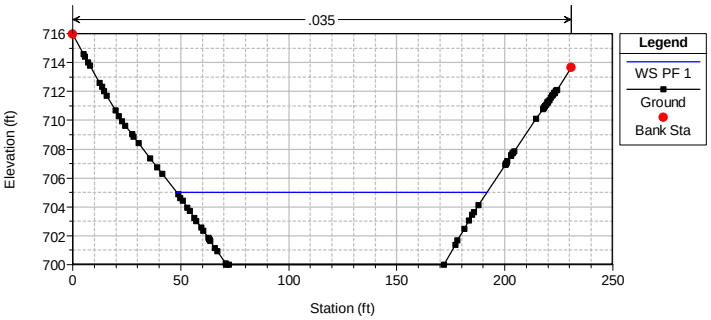
HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 15521



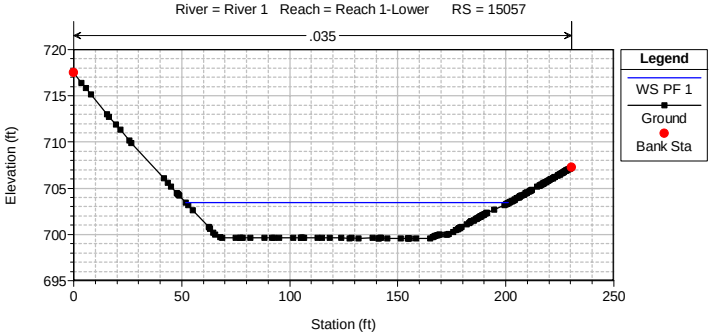
HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 15274



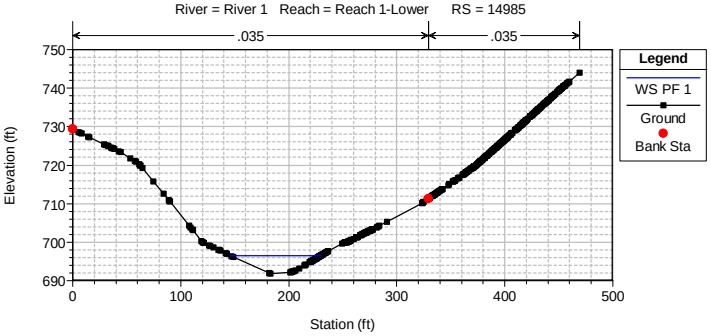
HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 15175



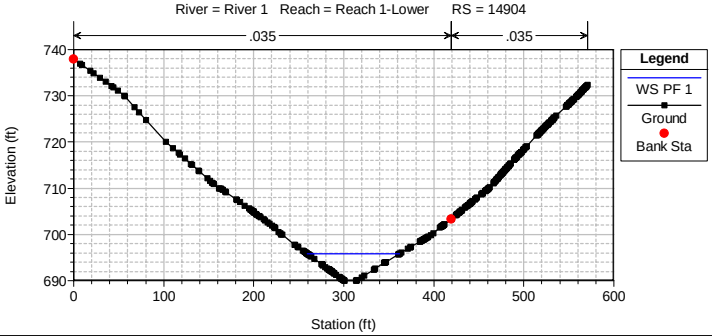
HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 15057



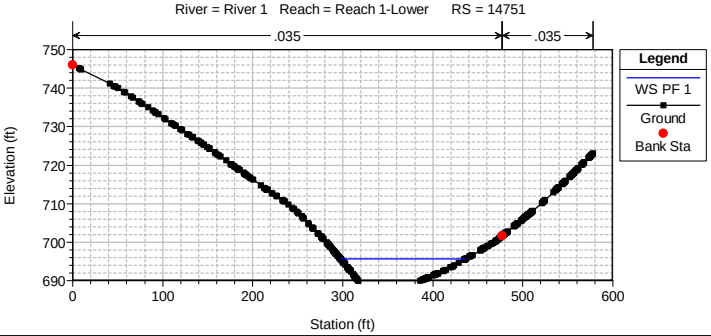
HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 14985

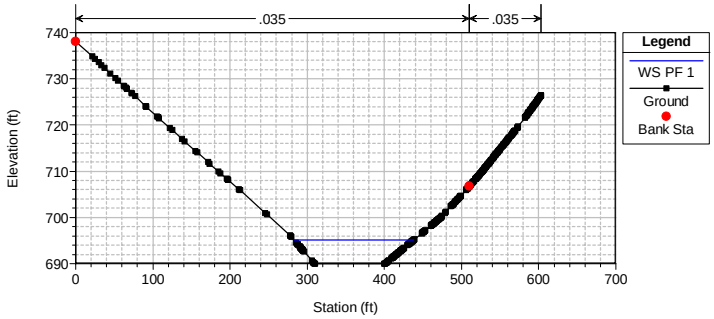


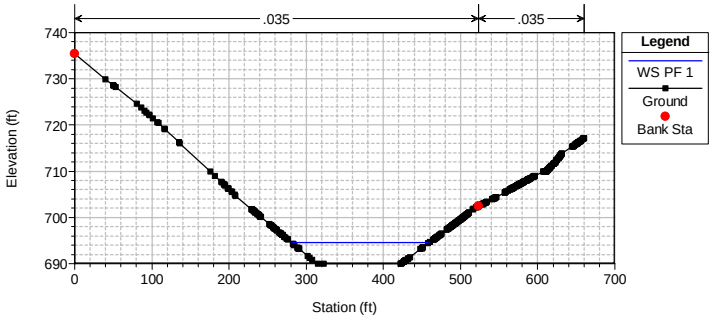
HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 14904

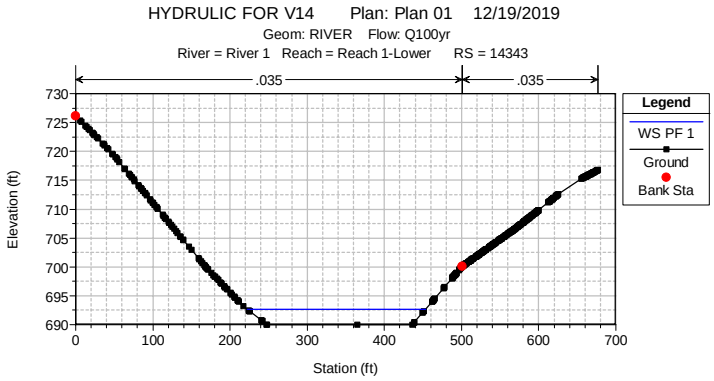


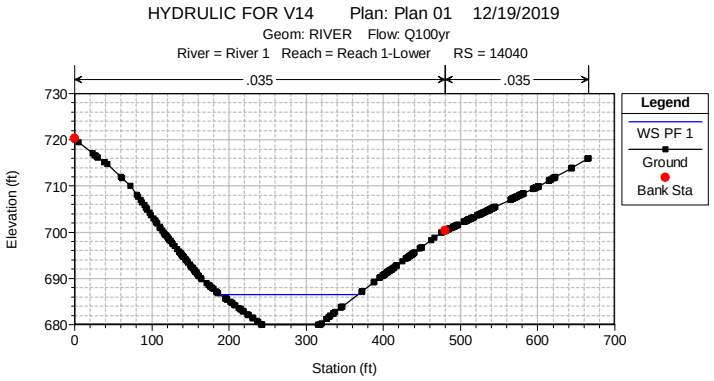
HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 14751

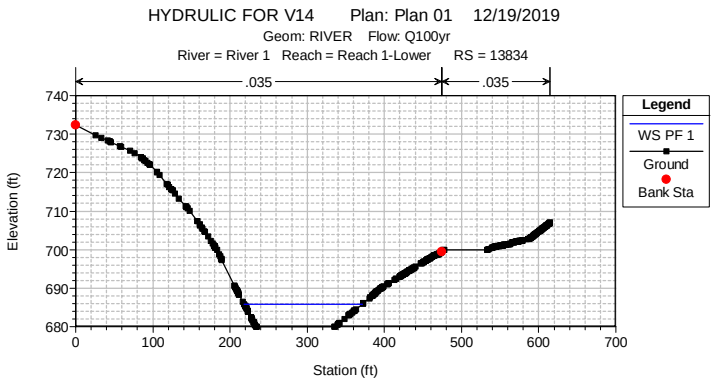


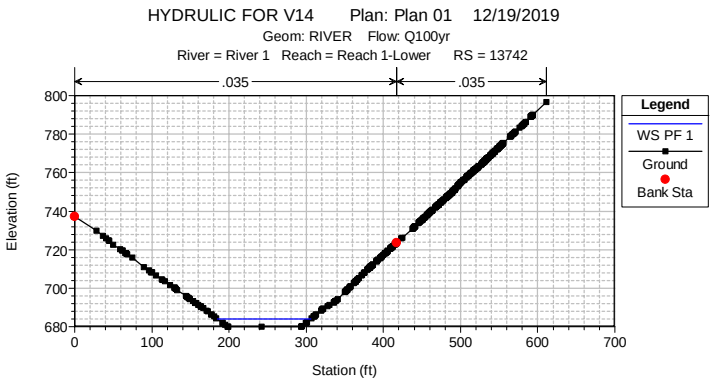

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 14643
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

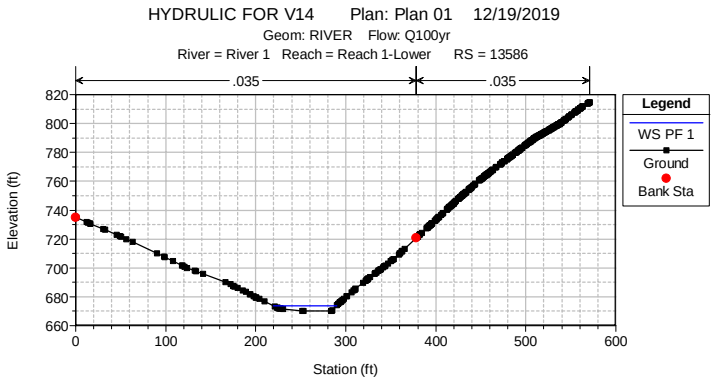

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 14531
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

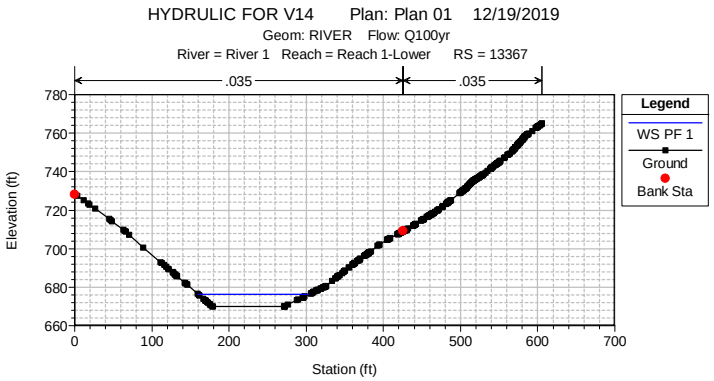

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 14343
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

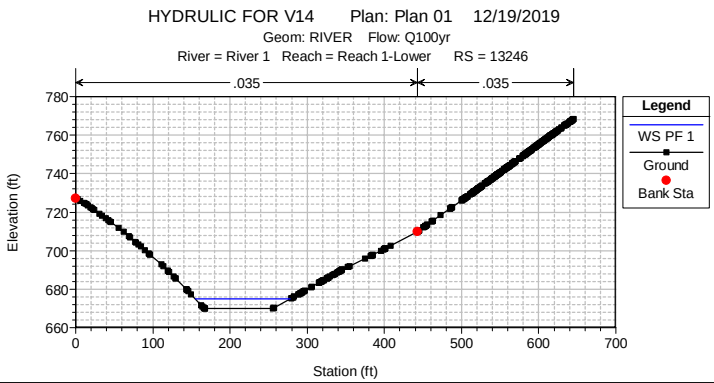

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 14040
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

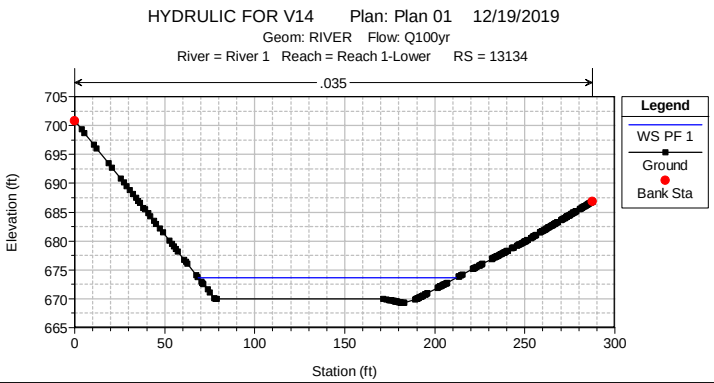

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 13834
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

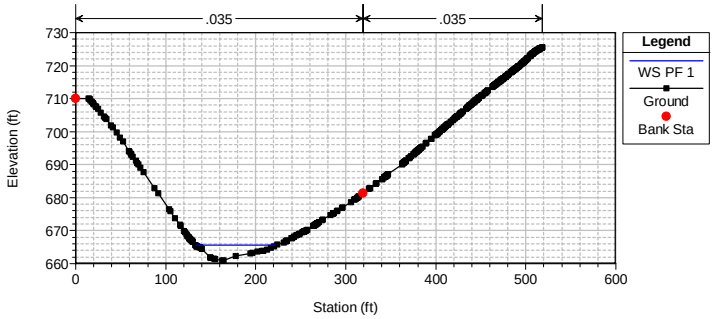

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 13742
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

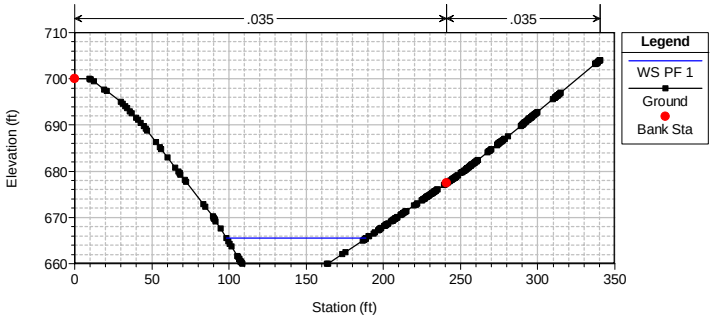

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 13586
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

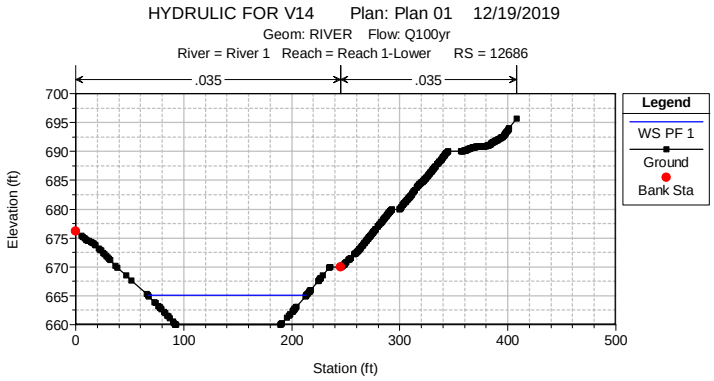

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 13367
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

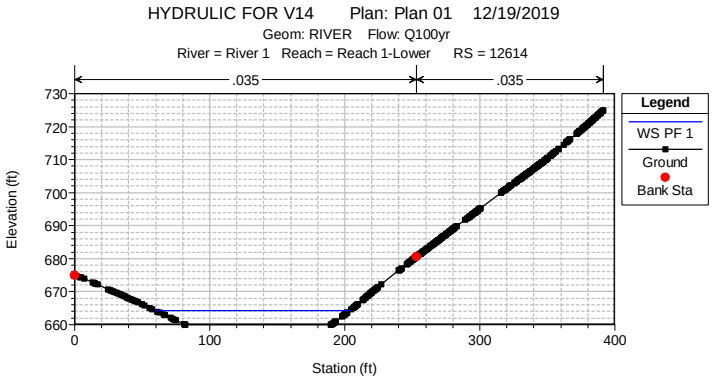

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 13246
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

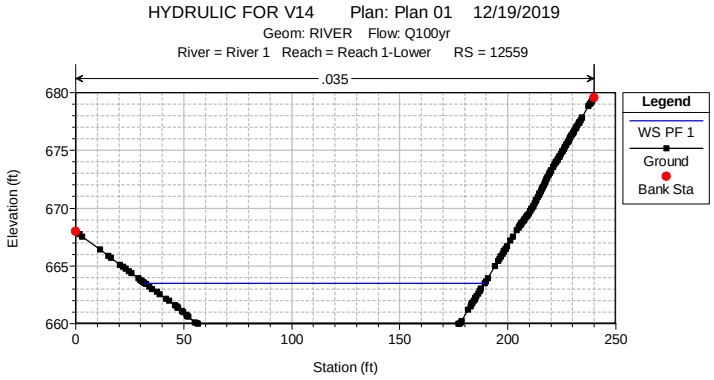

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 13134
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

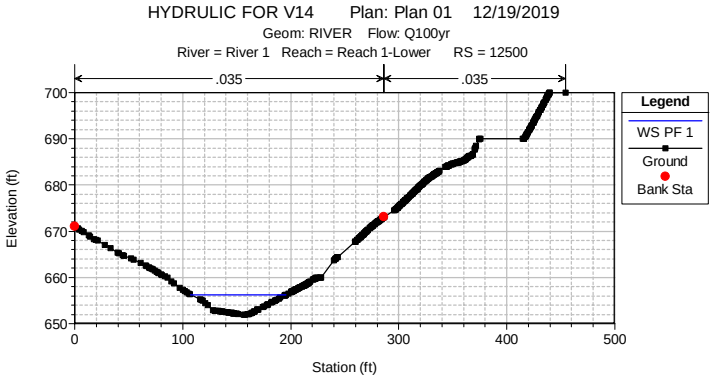

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 13050
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

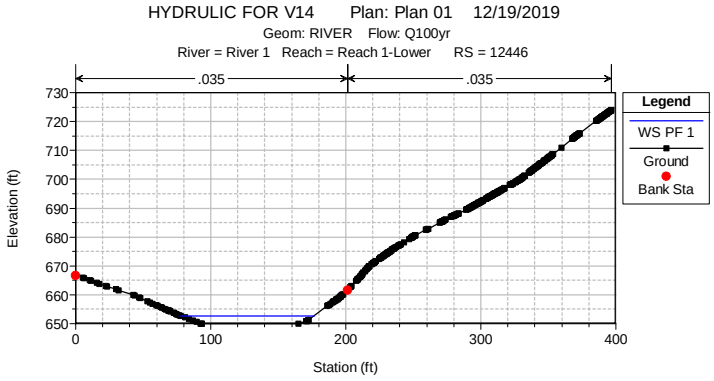

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 12844
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

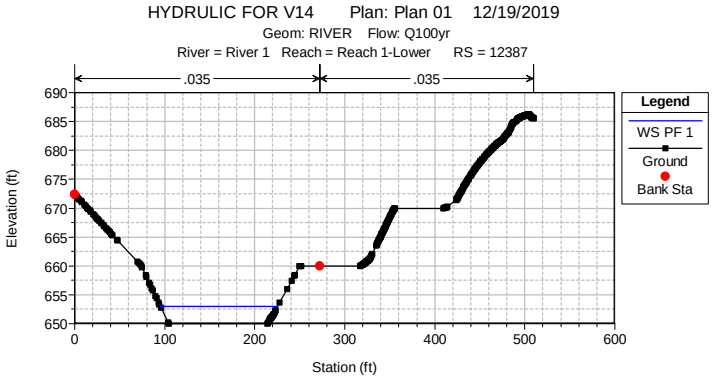

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 12686
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

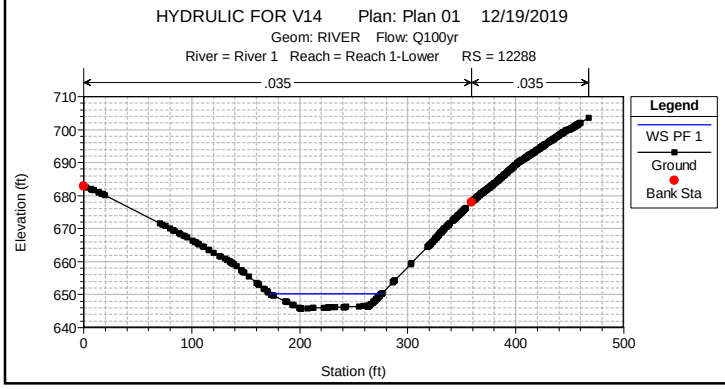

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 12614
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

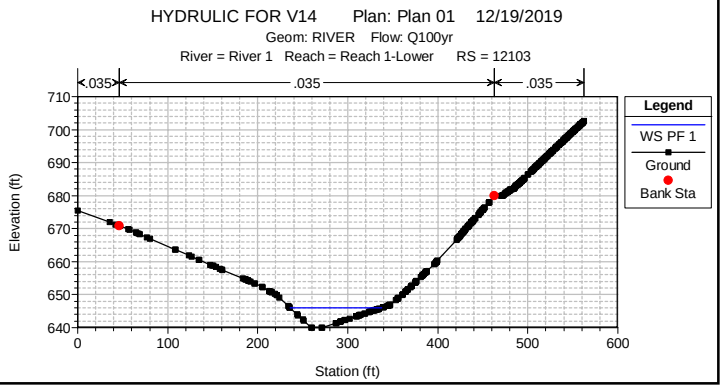

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 12559
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

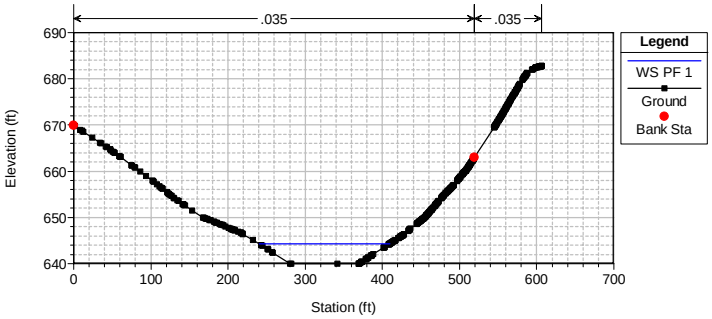

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 12500
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

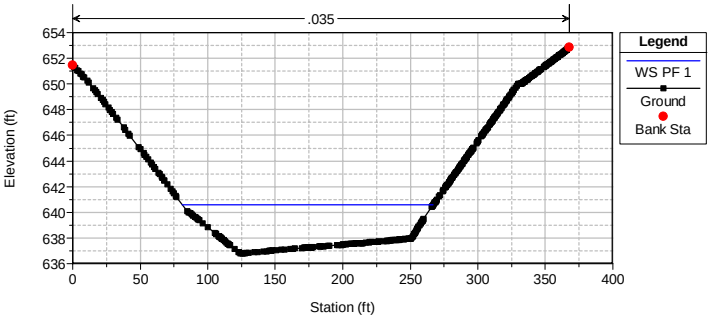

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 12446
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

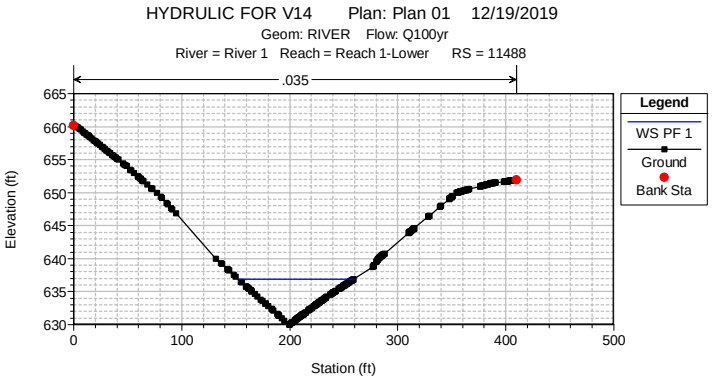

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 12387
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

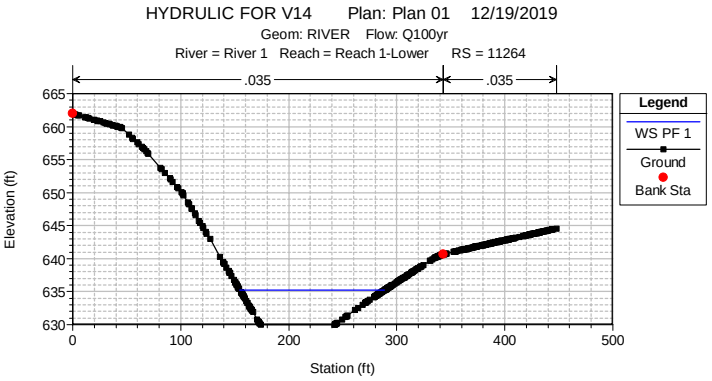

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 12288
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

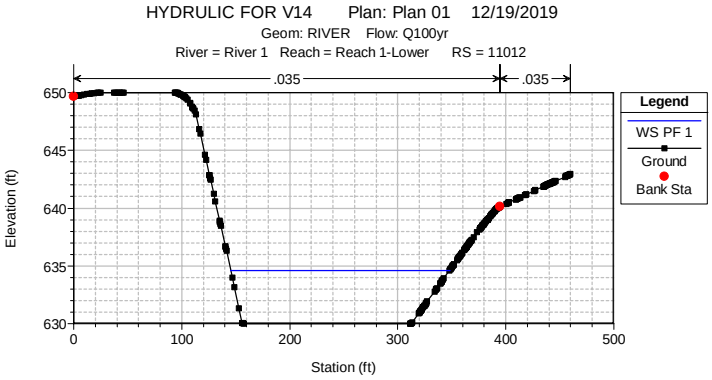

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 12103
.035
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

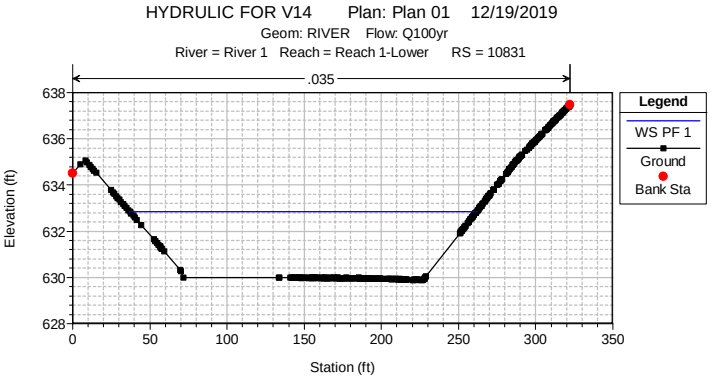

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 11930
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

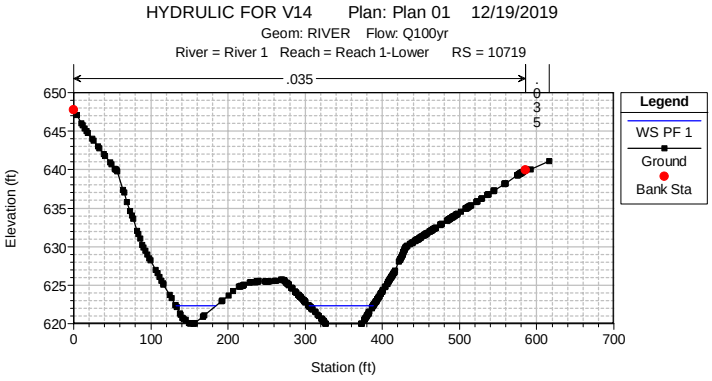

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 11618
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

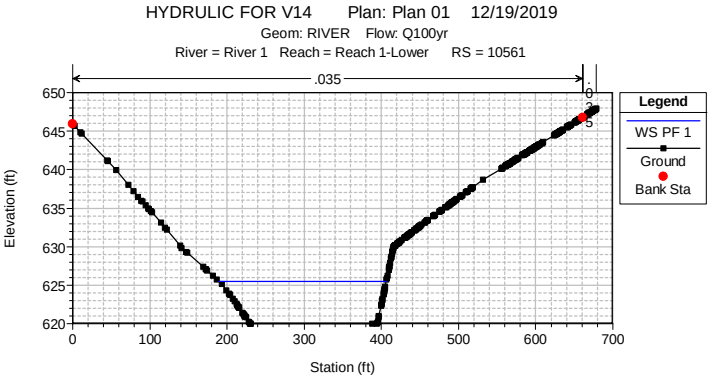

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 11488
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

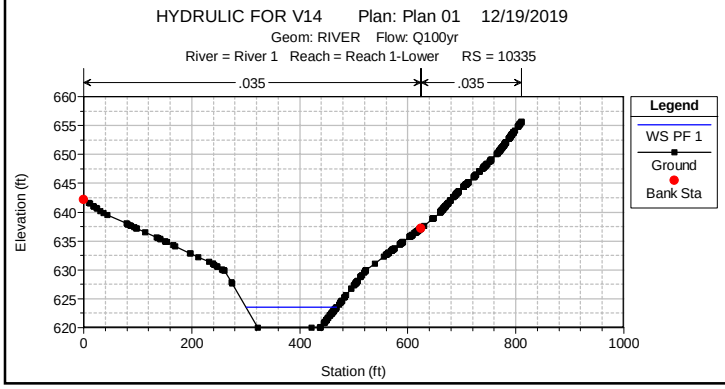

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 11264
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

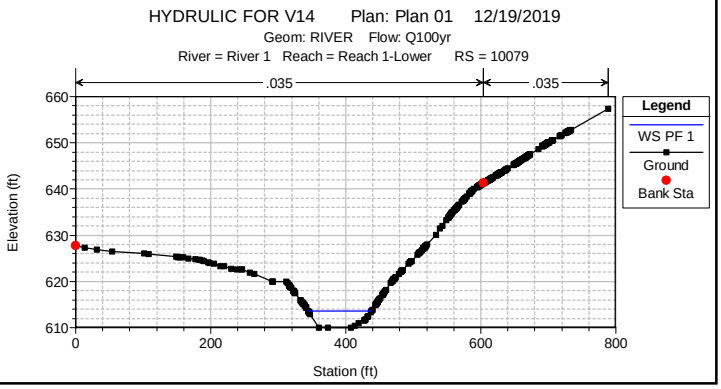

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 11012
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

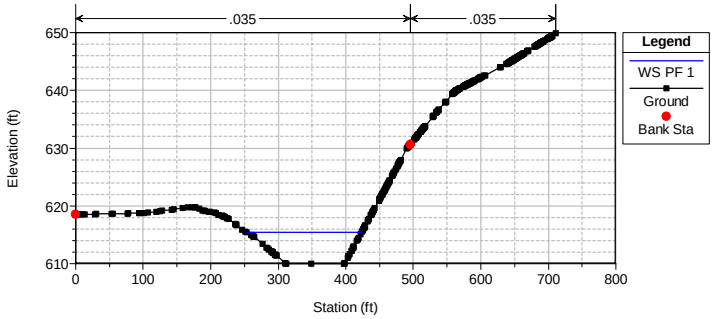

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 10831
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

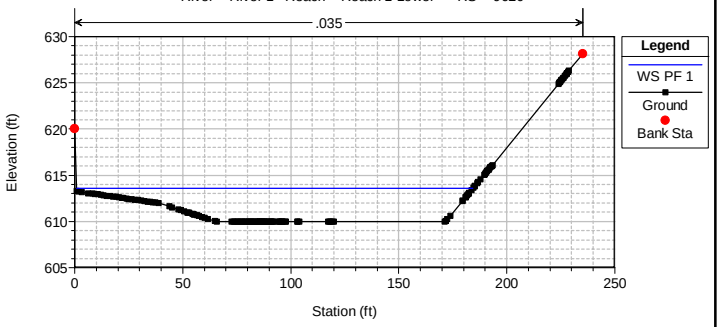

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 10719
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

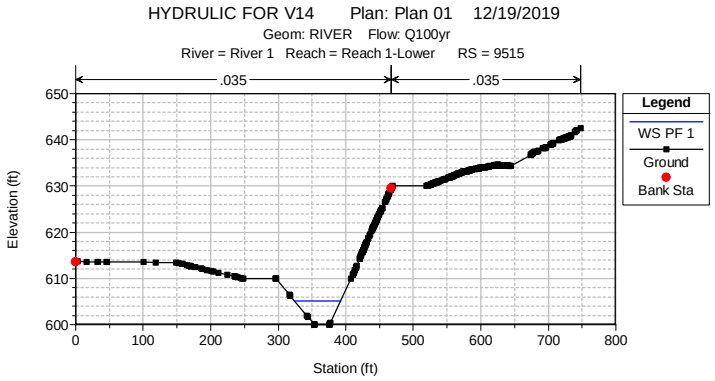

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 10561
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

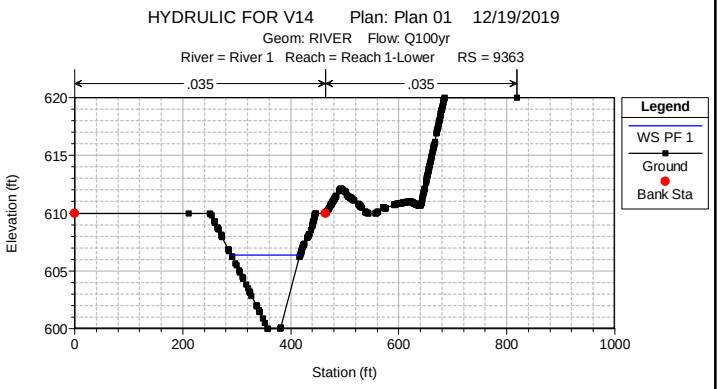

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 10335
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

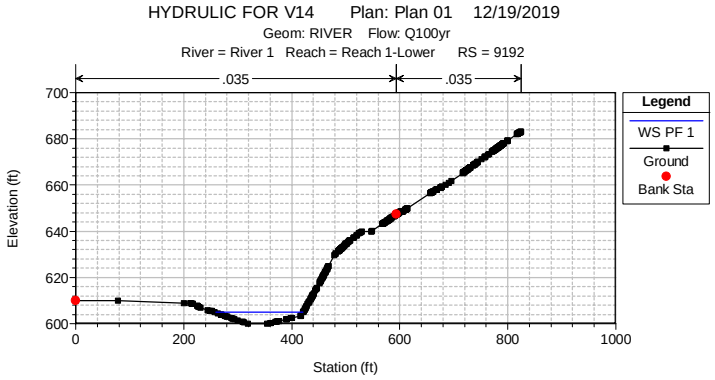

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 10079
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

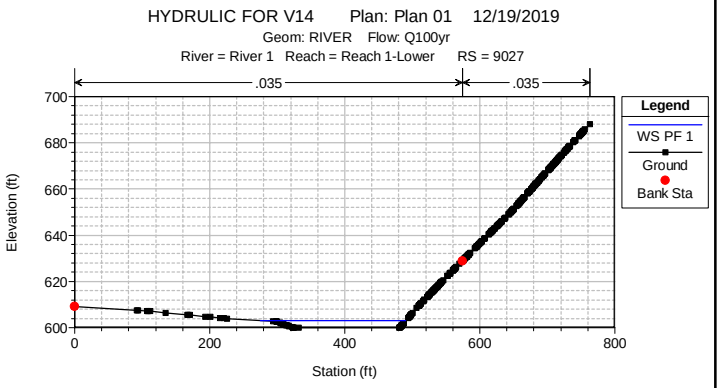

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 9778
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

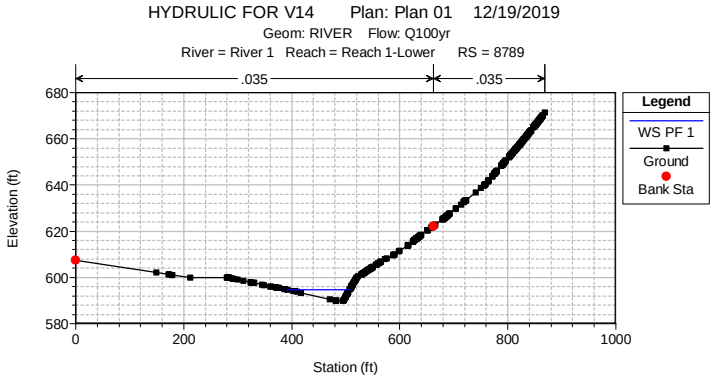

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 9620
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

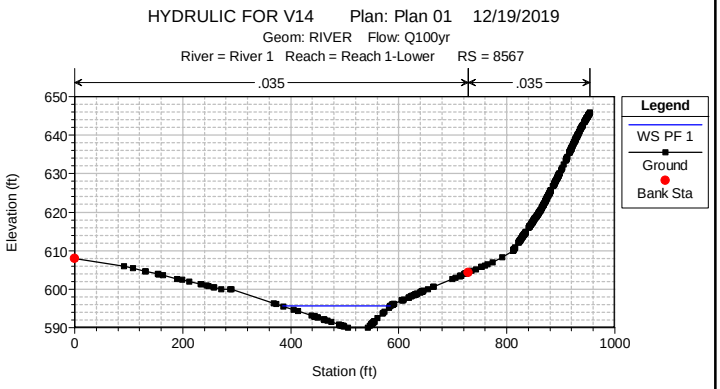

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 9515
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

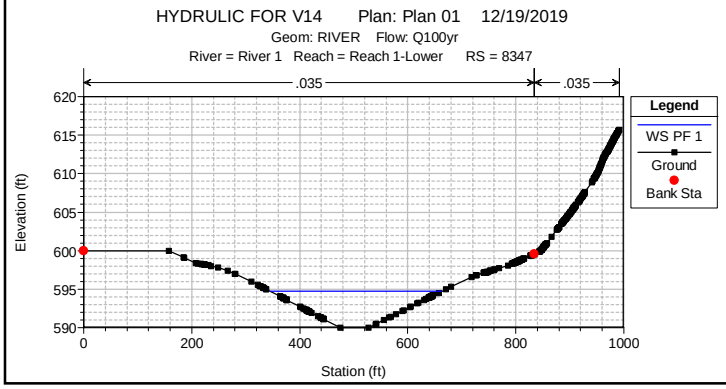

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 9363
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

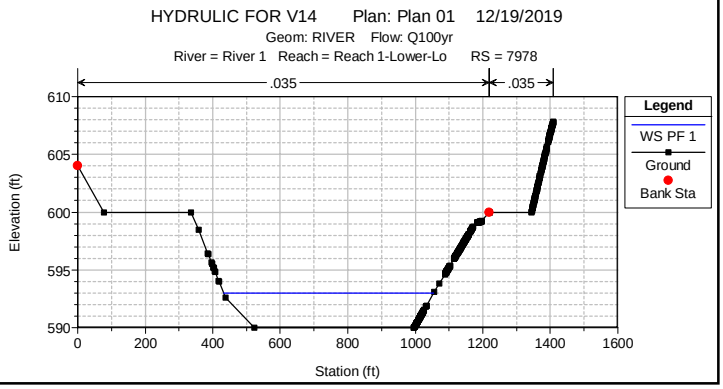

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 9192
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

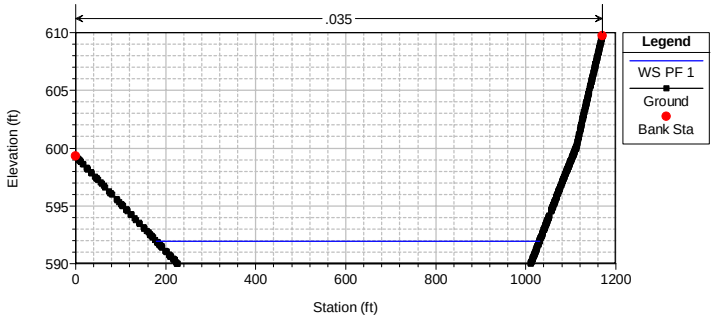

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 9027
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

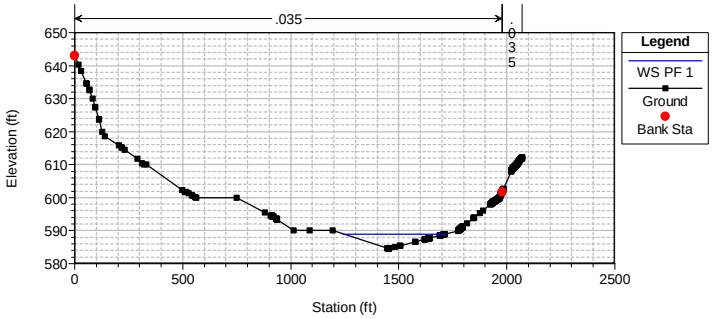

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 8789
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

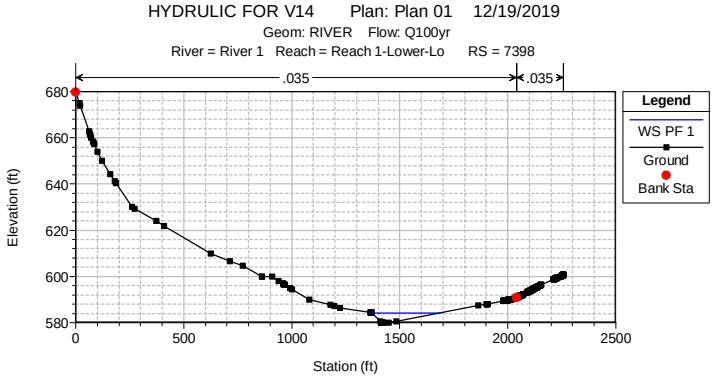

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 8567
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

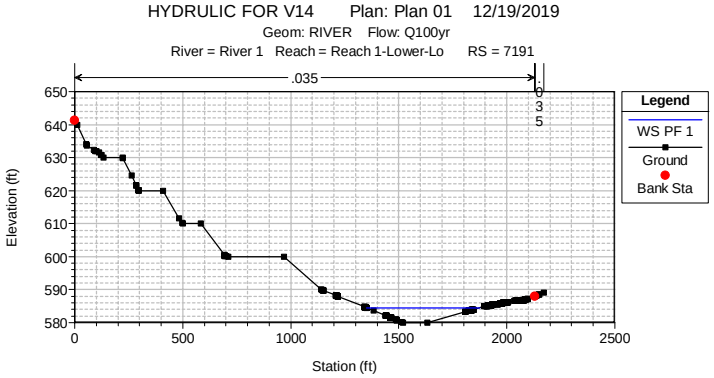

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower RS = 8347
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

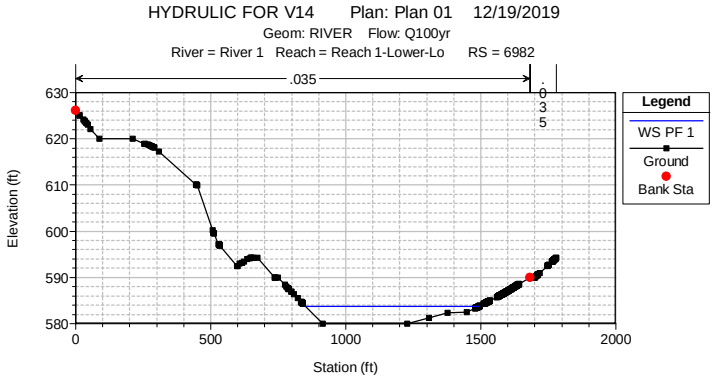

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower-Lo RS = 7978
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

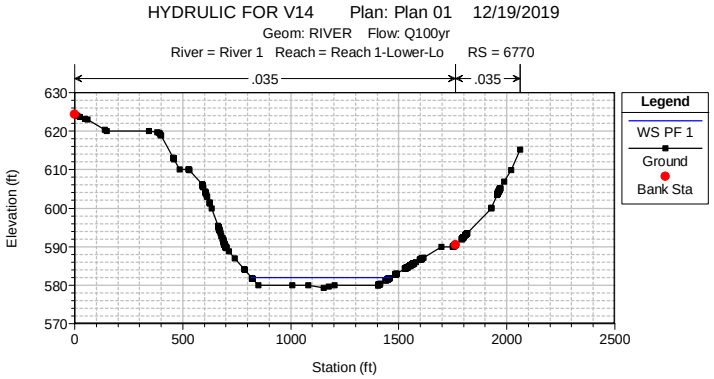

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower-Lo RS = 7799
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

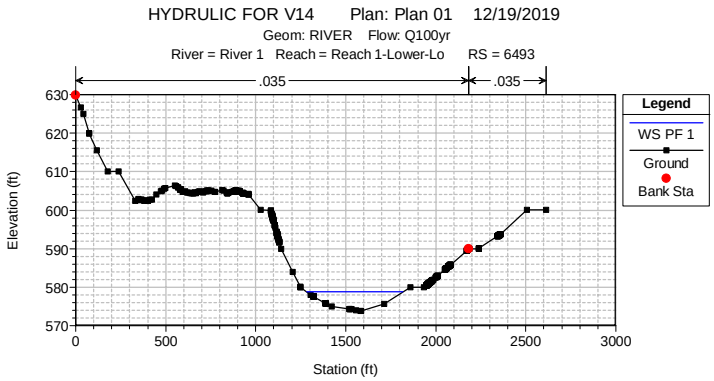

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower-Lo RS = 7578
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

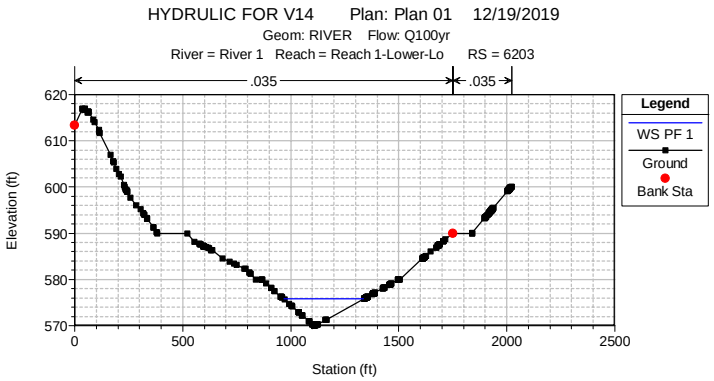

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower-Lo RS = 7398
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

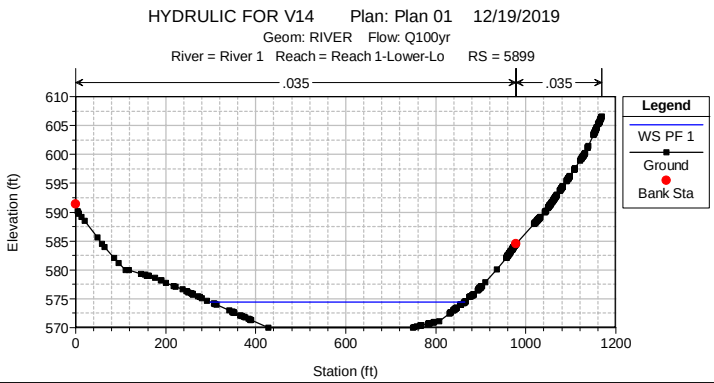

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower-Lo RS = 7191
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

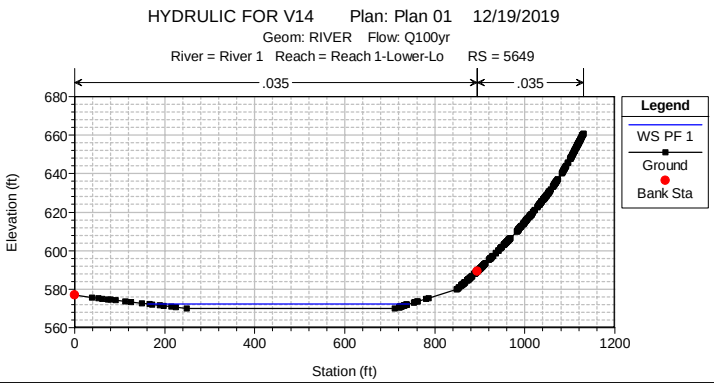

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower-Lo RS = 6982
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

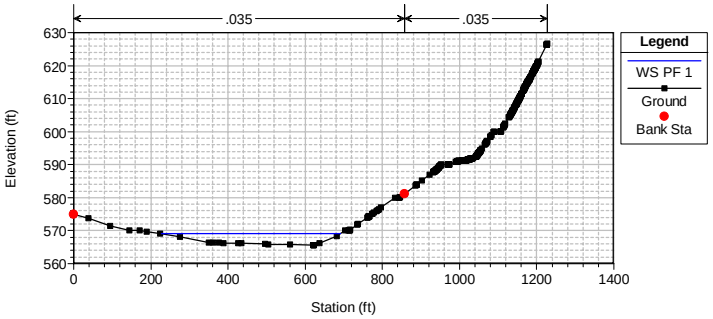

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower-Lo RS = 6770
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

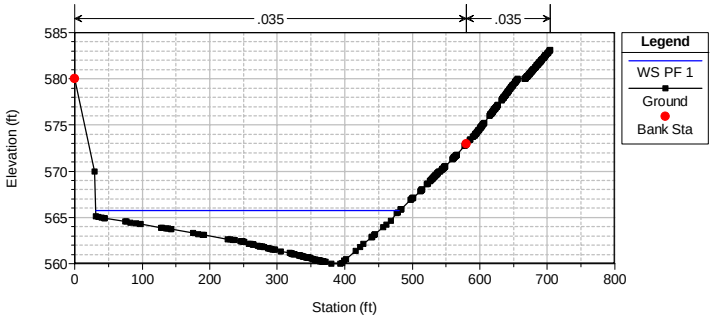

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower-Lo RS = 6493
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

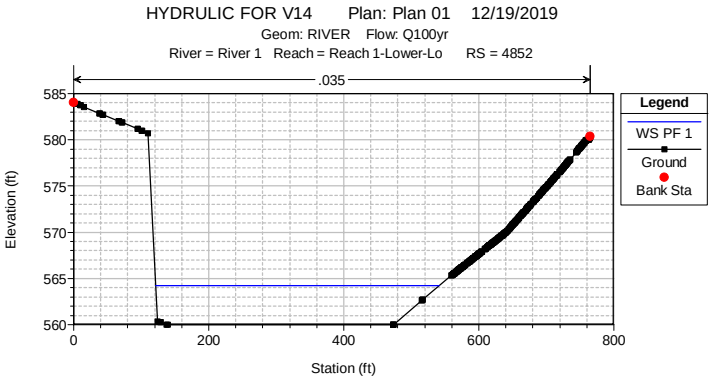

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower-Lo RS = 6203
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

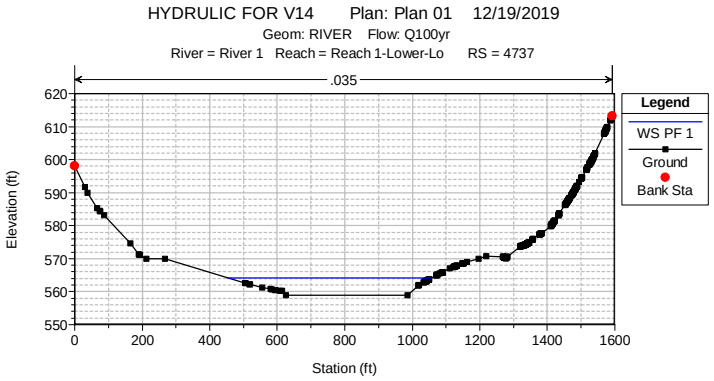

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower-Lo RS = 5899
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

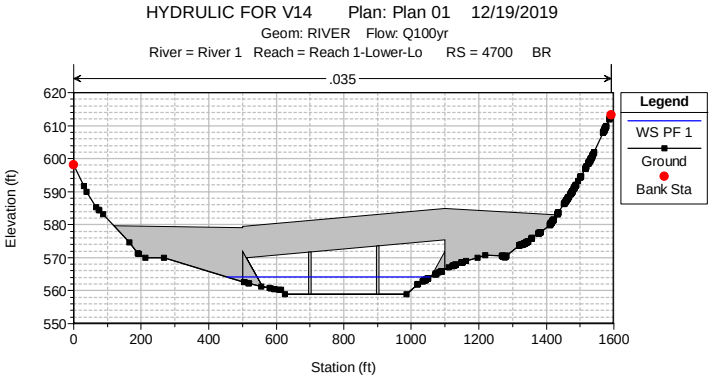

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower-Lo RS = 5649
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

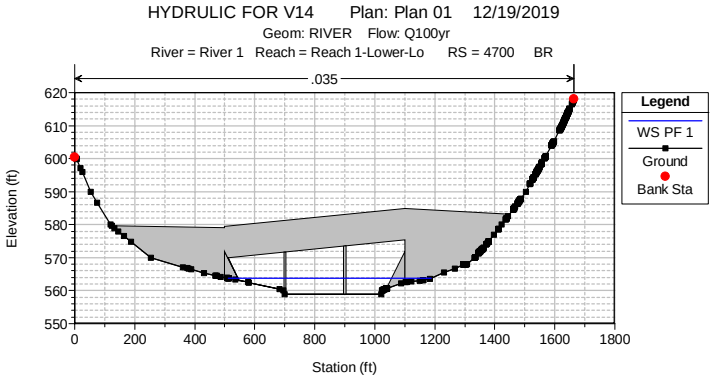

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower-Lo RS = 5429
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

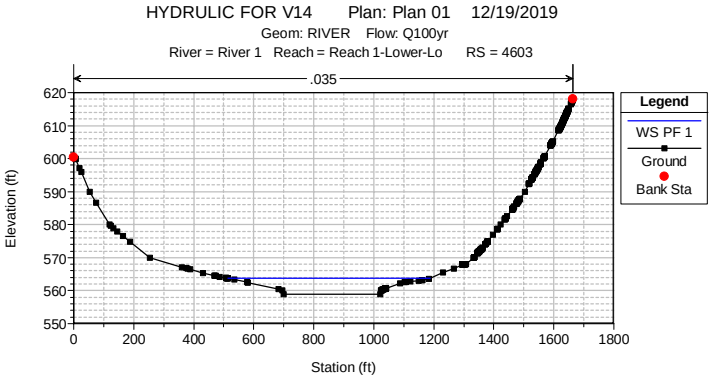

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower-Lo RS = 5177
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

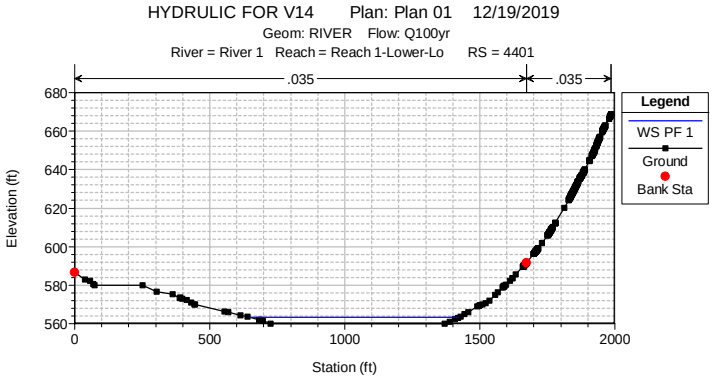

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower-Lo RS = 4852
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

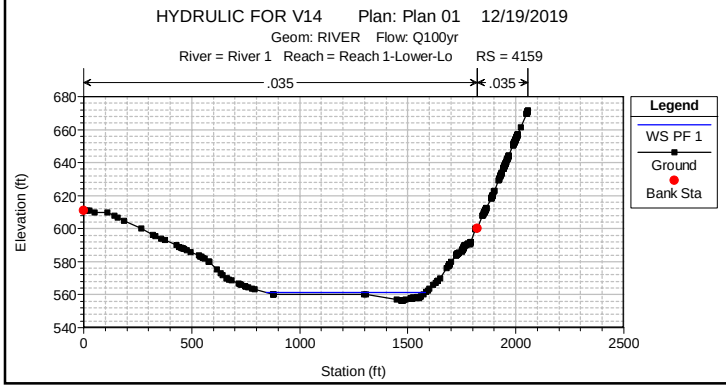

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower-Lo RS = 4737
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

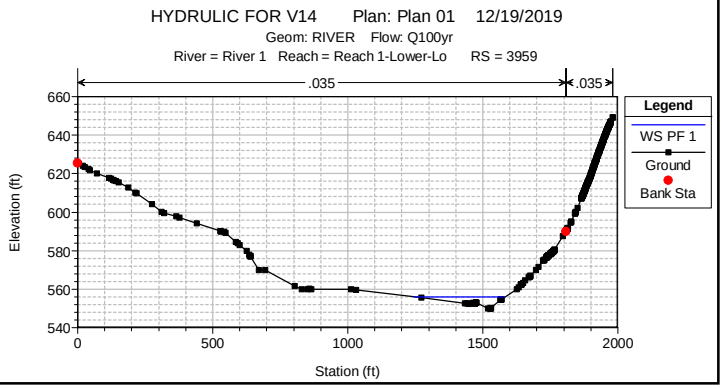

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower-Lo RS = 4700 BR
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

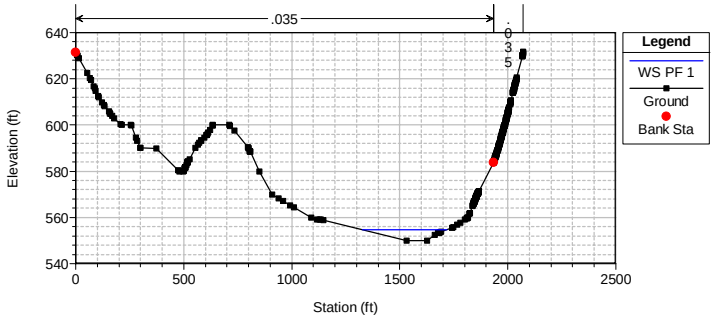

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower-Lo RS = 4700 BR
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

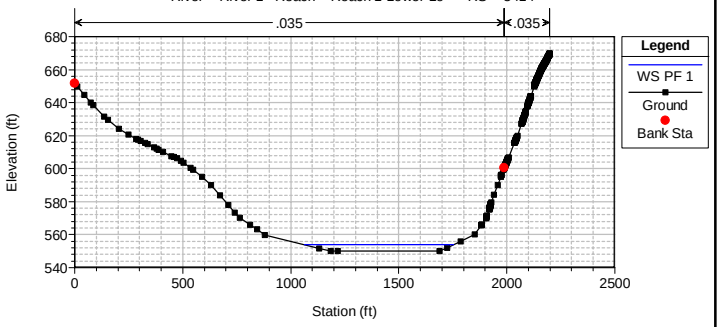

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower-Lo RS = 4603
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

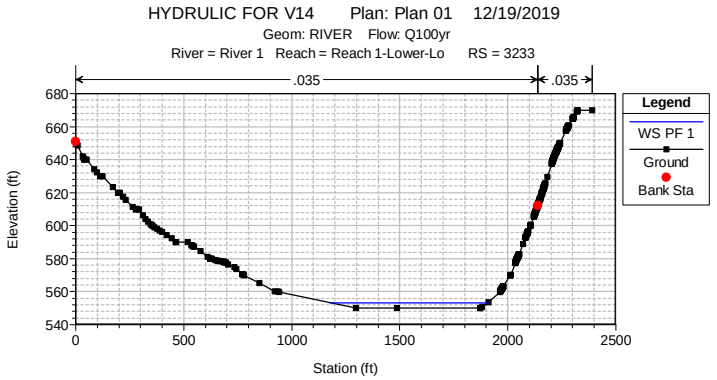

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower-Lo RS = 4401
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

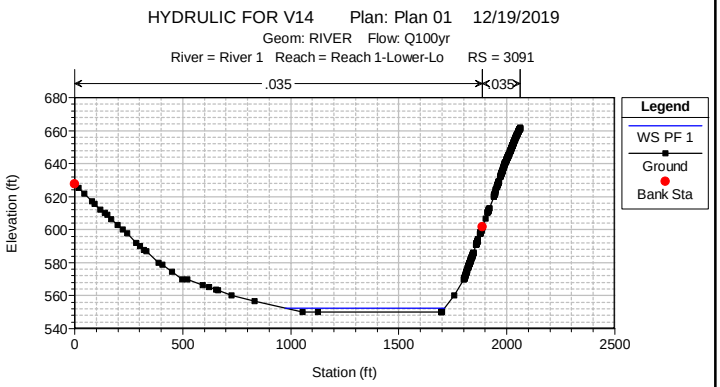

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower-Lo RS = 4159
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

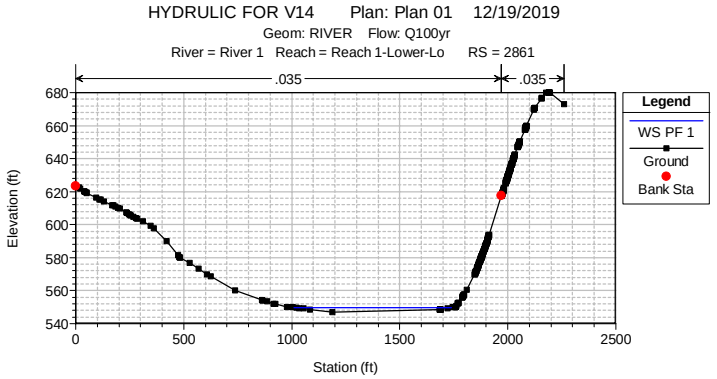

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower-Lo RS = 3959
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

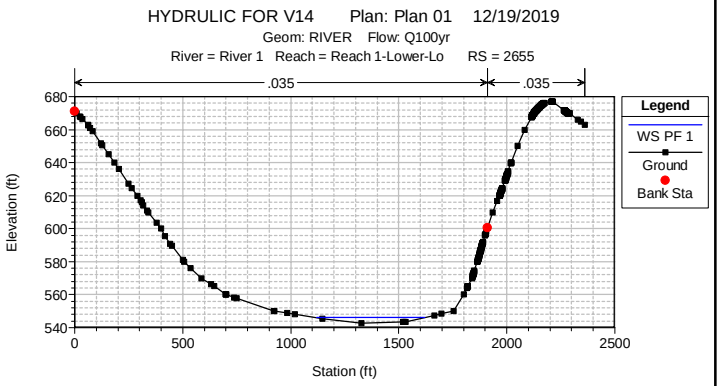

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower-Lo RS = 3731
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

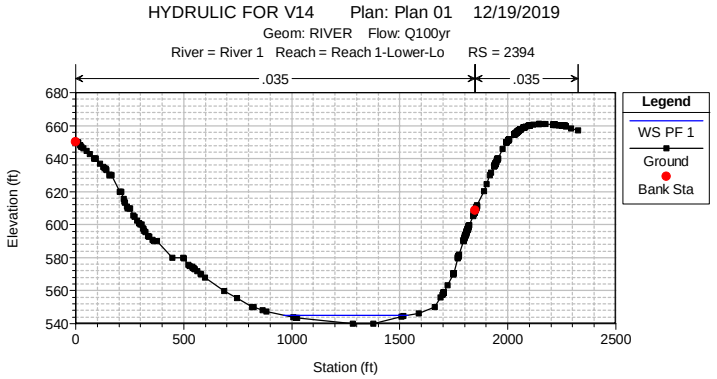

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower-Lo RS = 3414
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

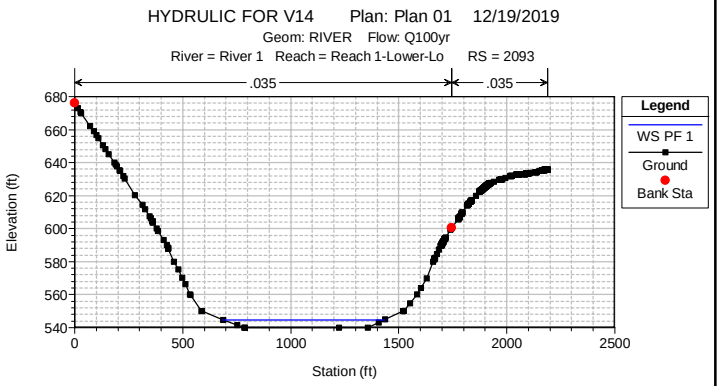

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower-Lo RS = 3233
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

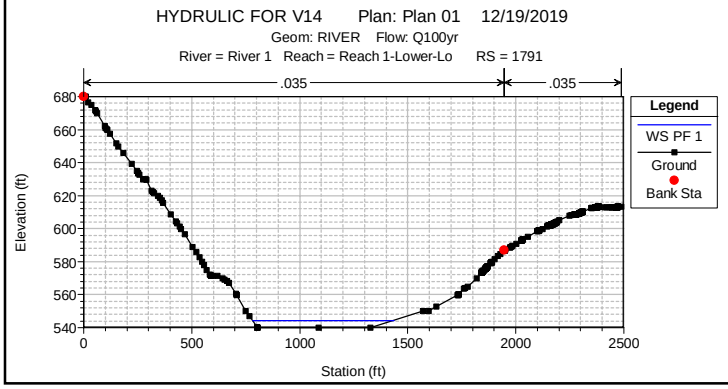

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower-Lo RS = 3091
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

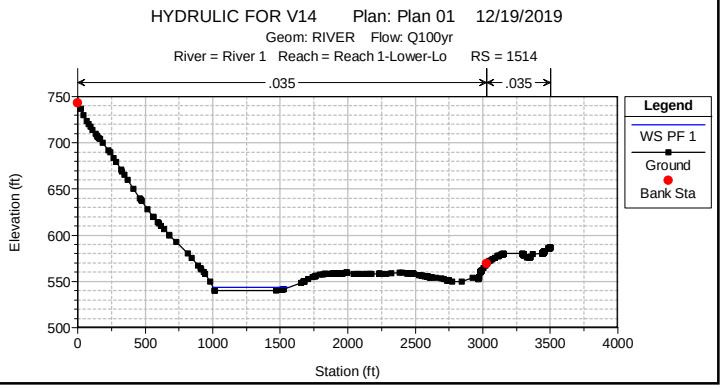

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower-Lo RS = 2861
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

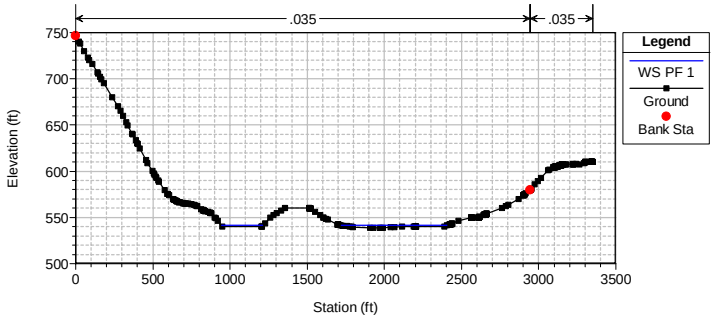

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower-Lo RS = 2655
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

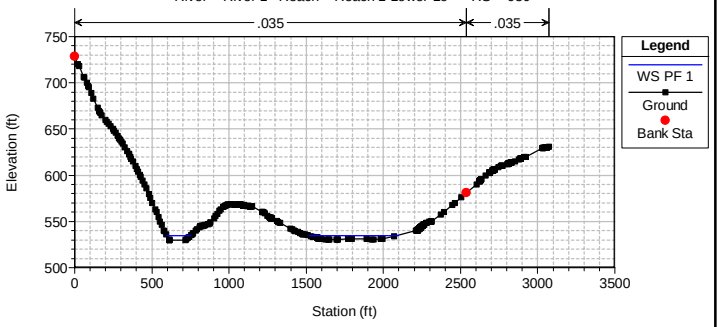

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower-Lo RS = 2394
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

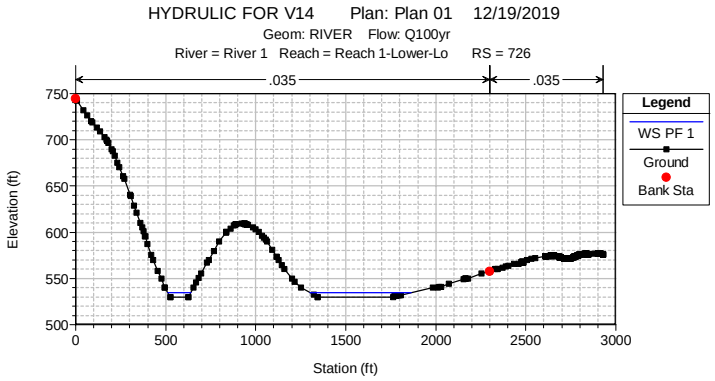

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower-Lo RS = 2093
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

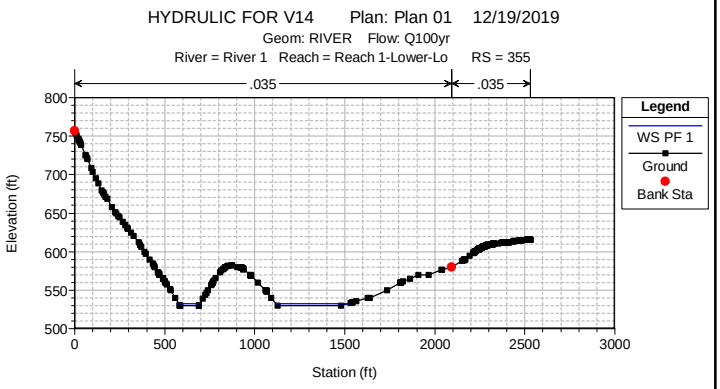

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower-Lo RS = 1791
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

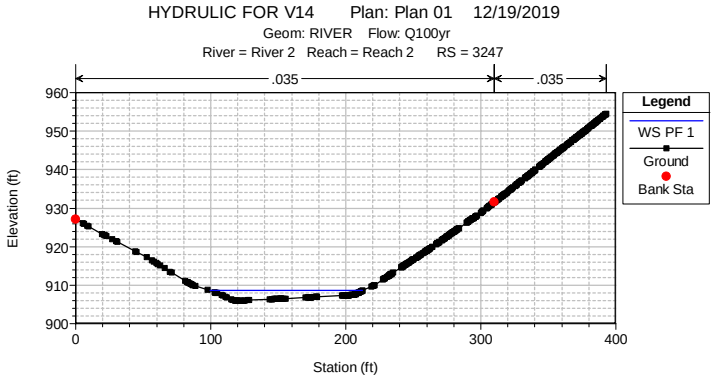

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower-Lo RS = 1514
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

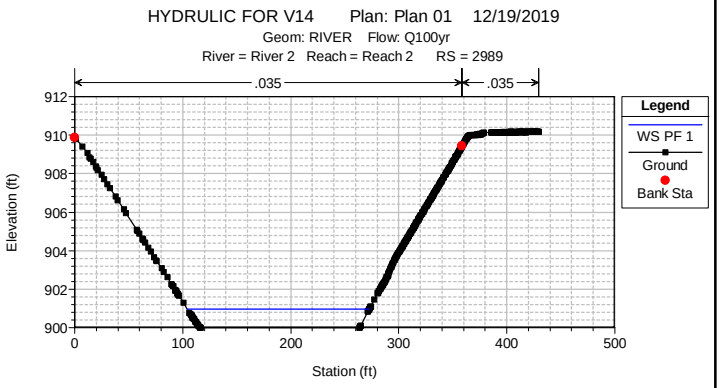

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower-Lo RS = 1244
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

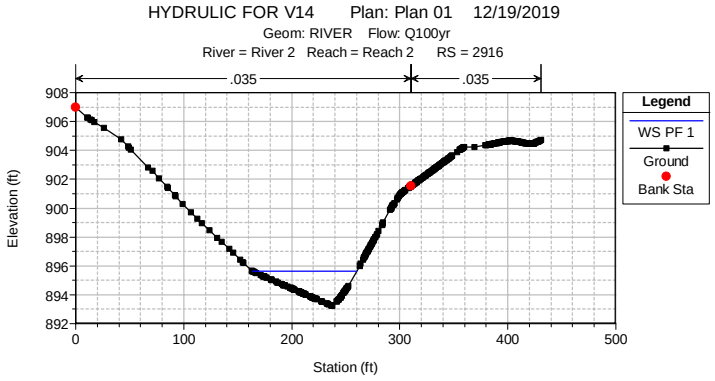

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower-Lo RS = 930
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

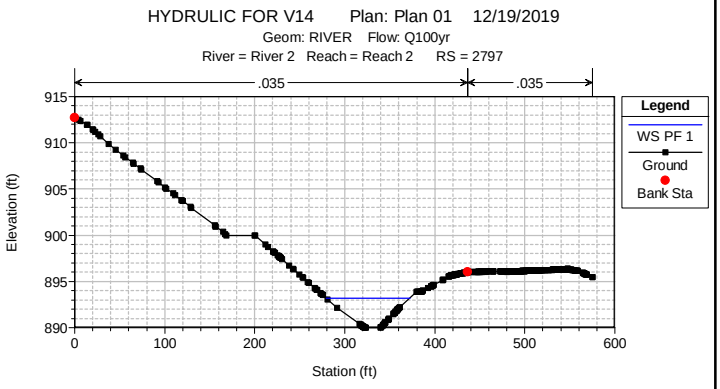

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower-Lo RS = 726
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

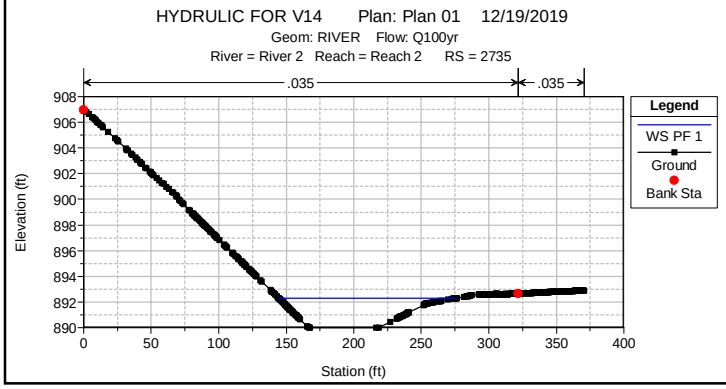

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 1 Reach = Reach 1-Lower-Lo RS = 355
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

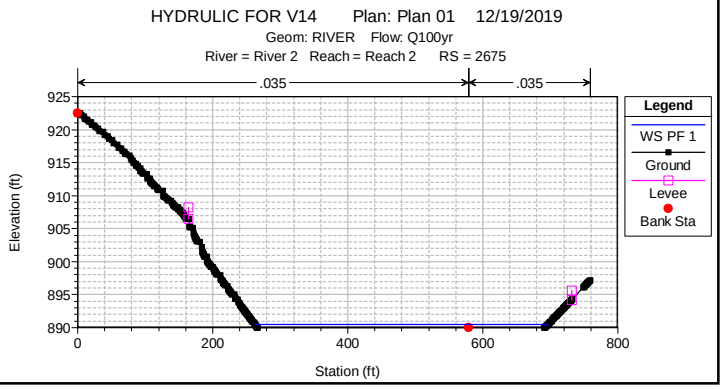

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 2 Reach = Reach 2 RS = 3247
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 2 Reach = Reach 2 RS = 2989
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

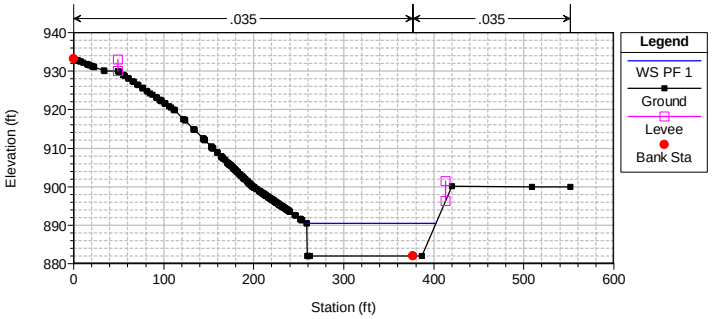

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 2 Reach = Reach 2 RS = 2916
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 2 Reach = Reach 2 RS = 2797
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

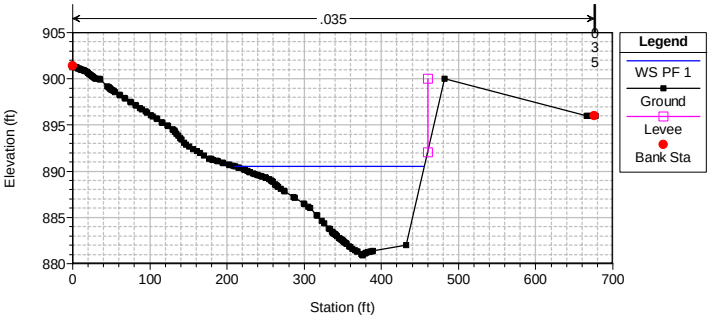

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 2 Reach = Reach 2 RS = 2735
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 2 Reach = Reach 2 RS = 2675
.035
.035
Legend
WS PF 1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

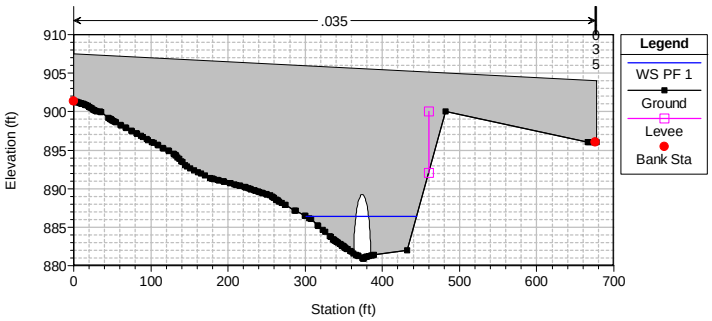
HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 2 Reach = Reach 2 RS = 2583



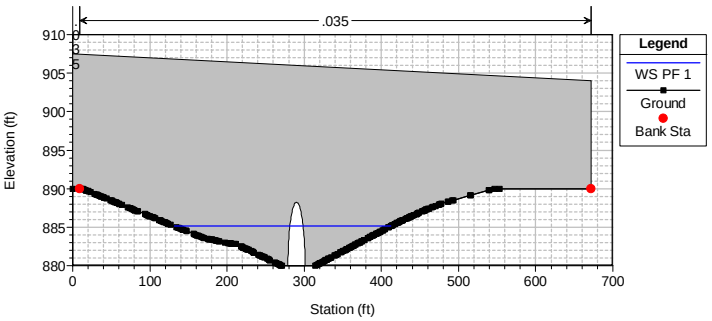
HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 2 Reach = Reach 2 RS = 2338



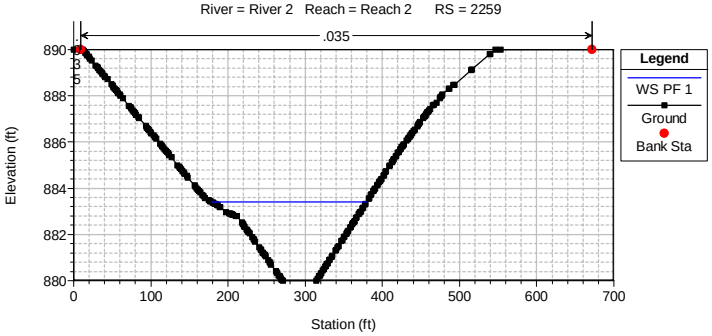
HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 2 Reach = Reach 2 RS = 2300 Culv



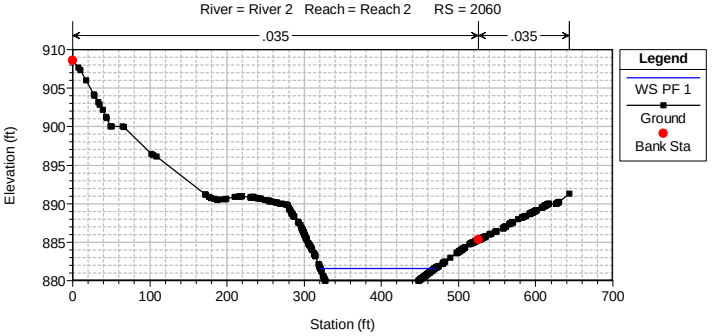
HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 2 Reach = Reach 2 RS = 2300 Culv



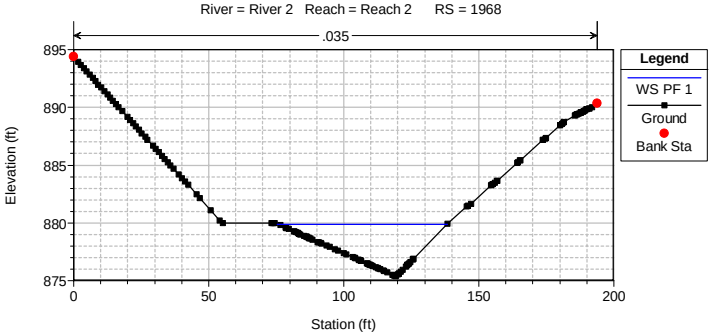
HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 2 Reach = Reach 2 RS = 2259



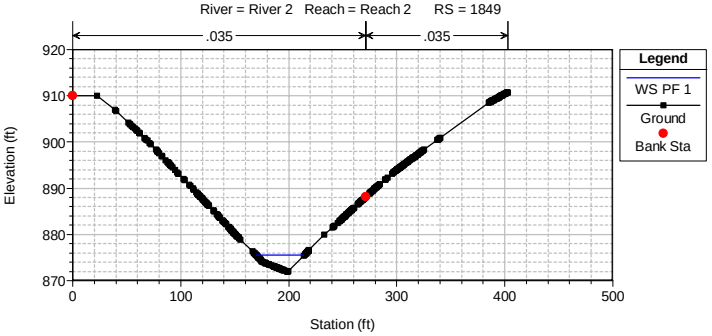
HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 2 Reach = Reach 2 RS = 2060



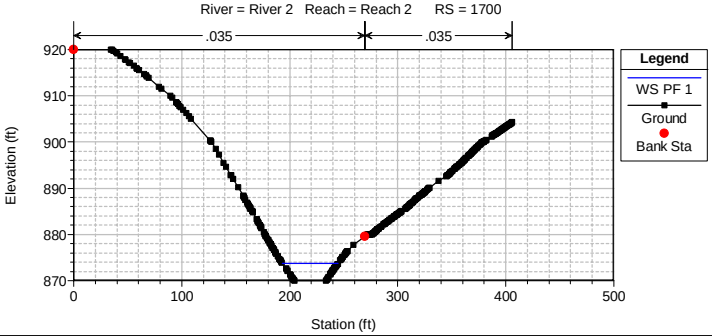
HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 2 Reach = Reach 2 RS = 1968



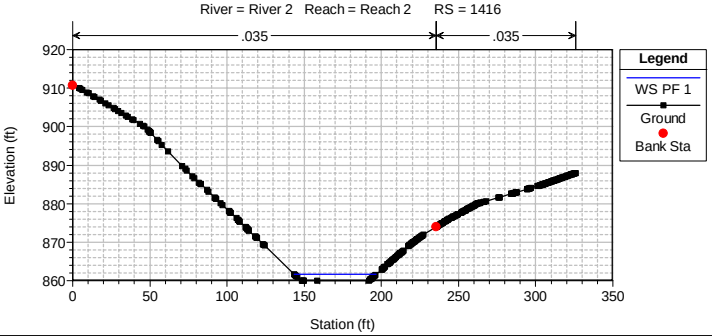
HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 2 Reach = Reach 2 RS = 1849

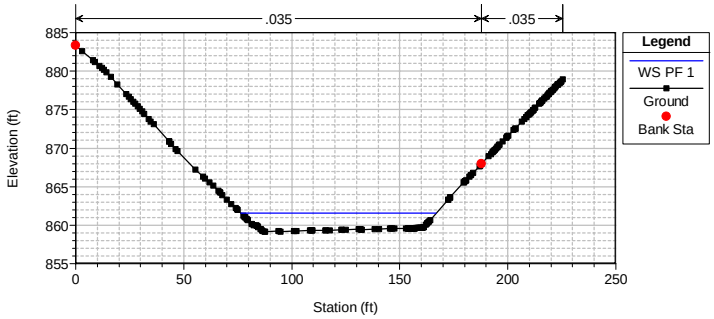


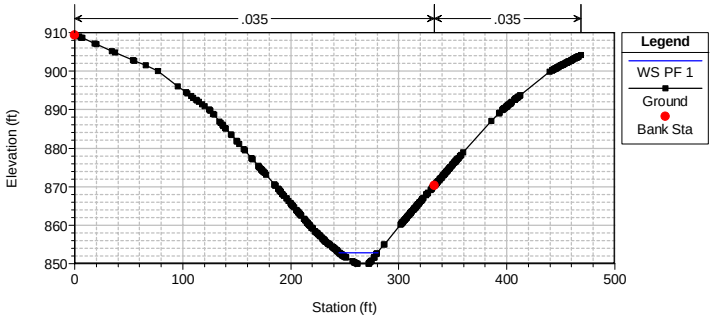
HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 2 Reach = Reach 2 RS = 1700

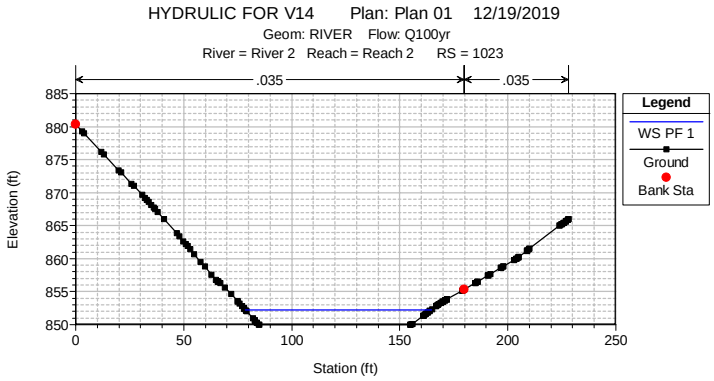


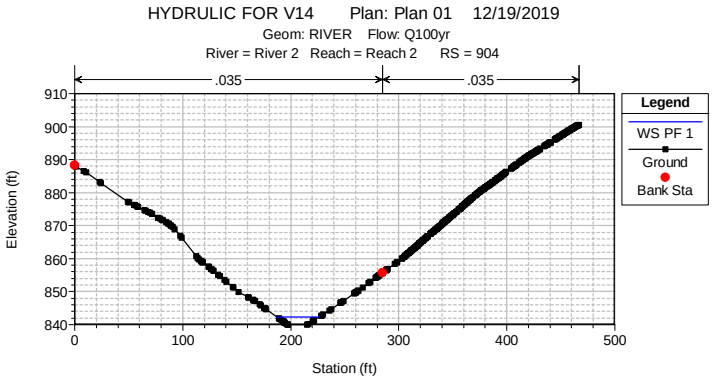
HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 2 Reach = Reach 2 RS = 1416

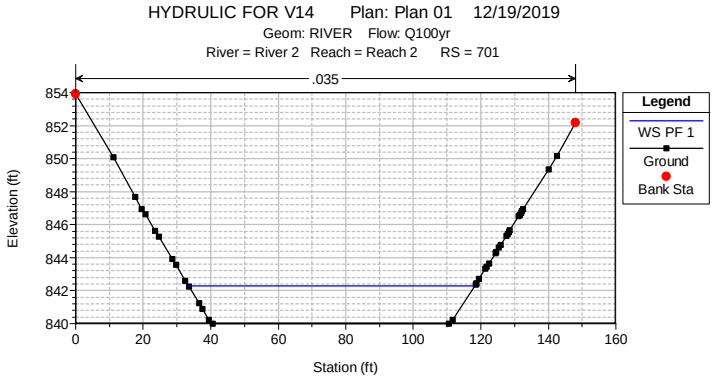


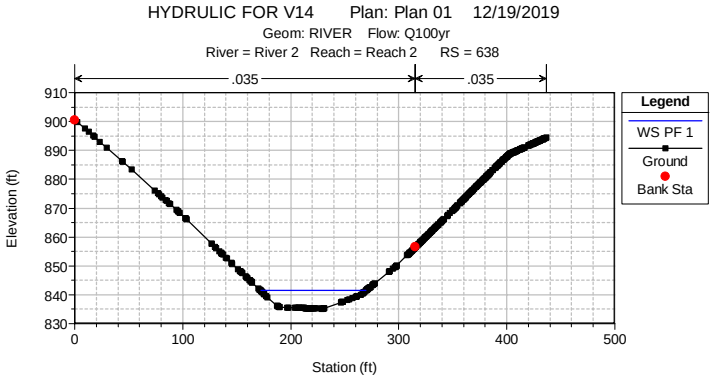

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 2 Reach = Reach 2 RS = 1280
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

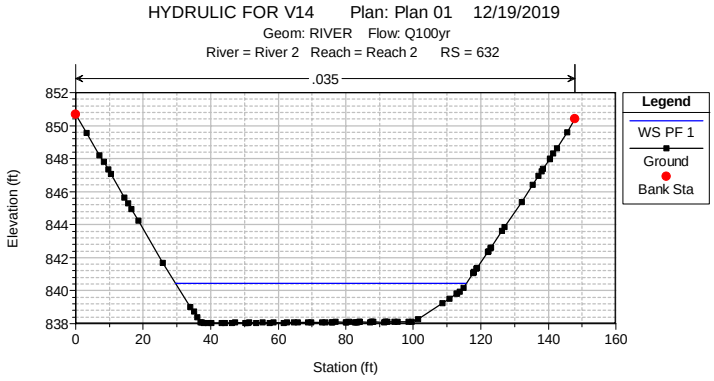

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 2 Reach = Reach 2 RS = 1215
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

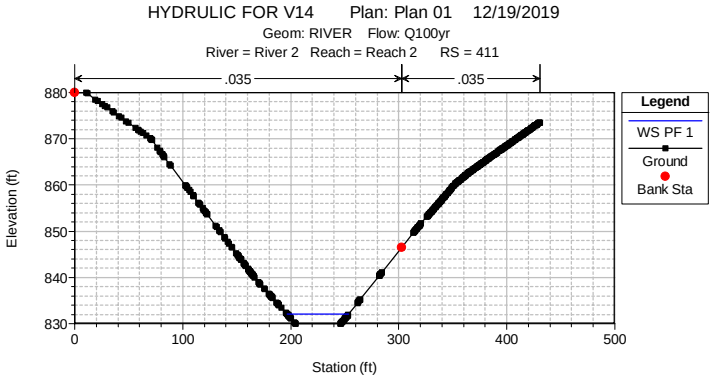

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 2 Reach = Reach 2 RS = 1023
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

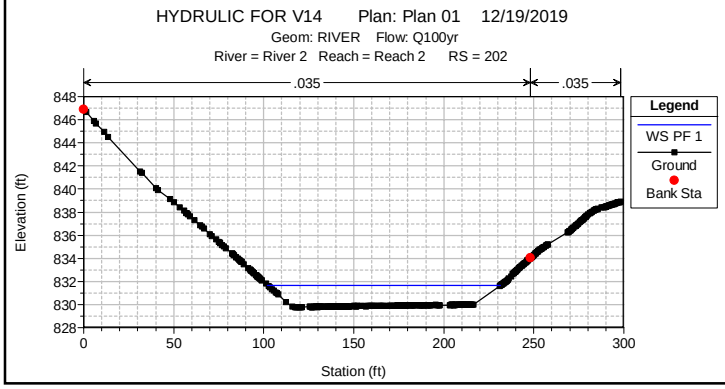

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 2 Reach = Reach 2 RS = 904
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

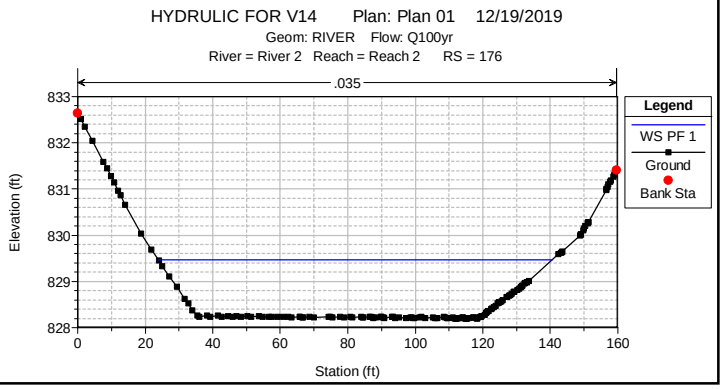

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 2 Reach = Reach 2 RS = 701
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

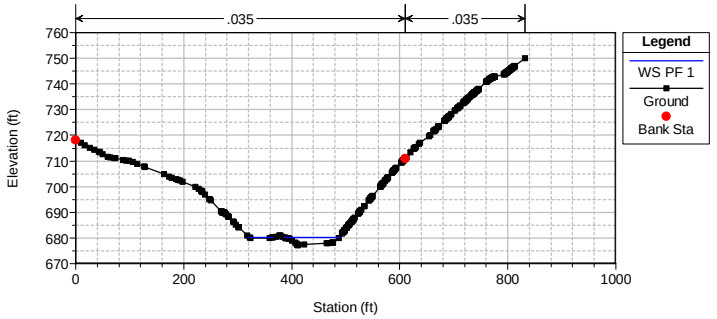

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 2 Reach = Reach 2 RS = 638
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

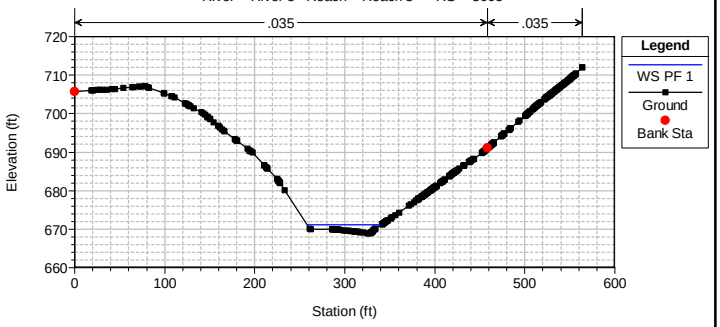

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 2 Reach = Reach 2 RS = 632
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

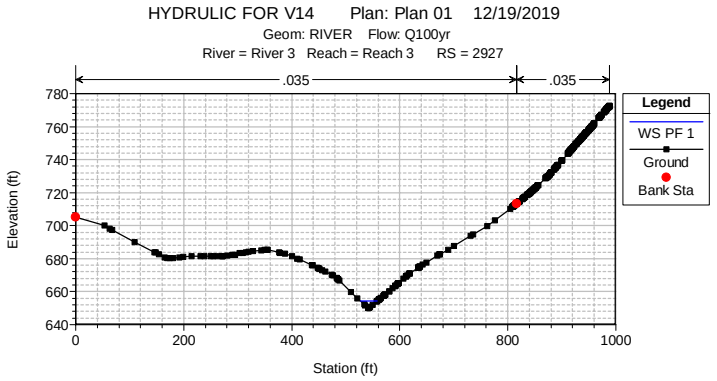

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 2 Reach = Reach 2 RS = 411
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

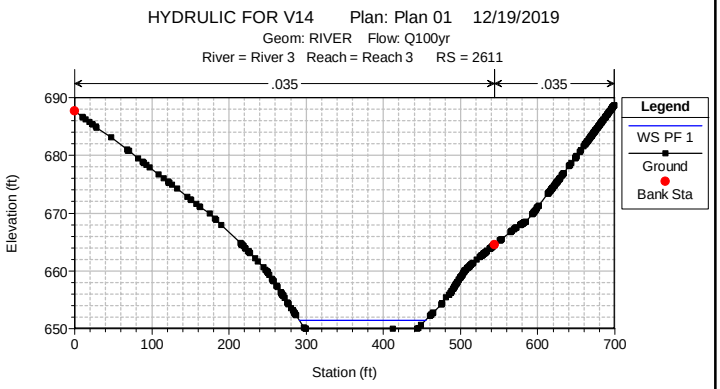

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 2 Reach = Reach 2 RS = 202
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

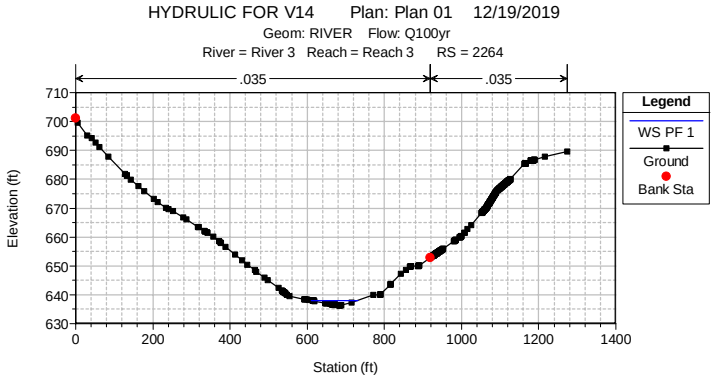

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 2 Reach = Reach 2 RS = 176
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

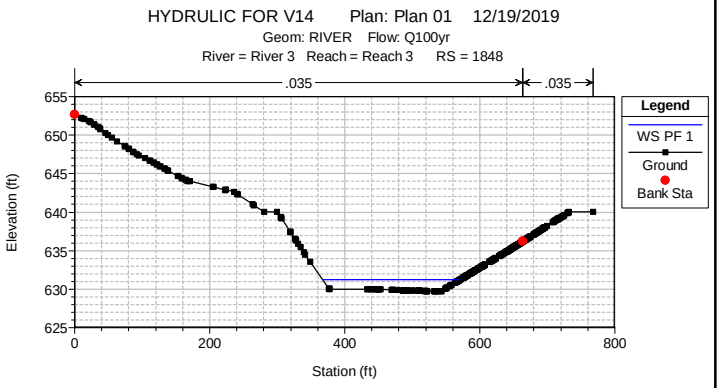

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 3 Reach = Reach 3 RS = 3319
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

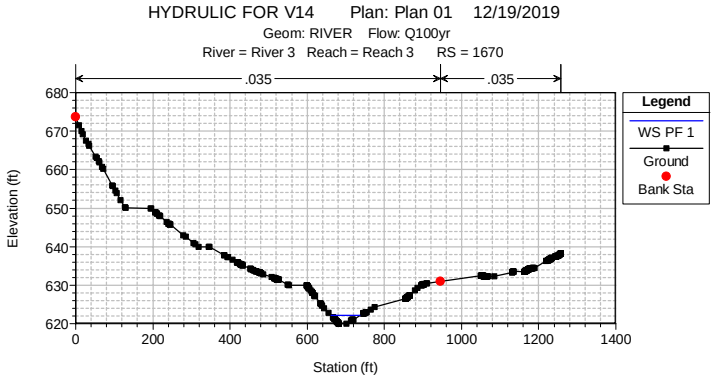

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 3 Reach = Reach 3 RS = 3065
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

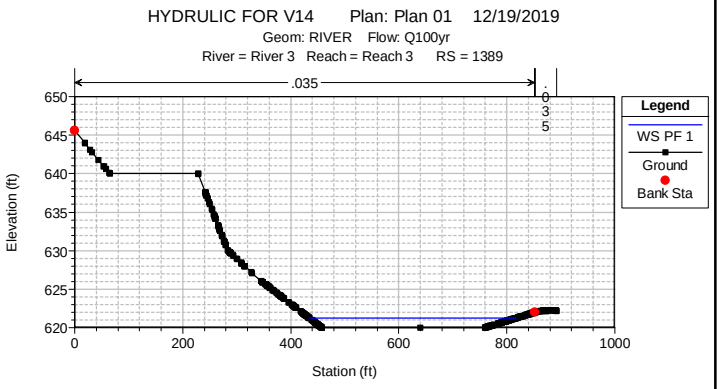

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 3 Reach = Reach 3 RS = 2927
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

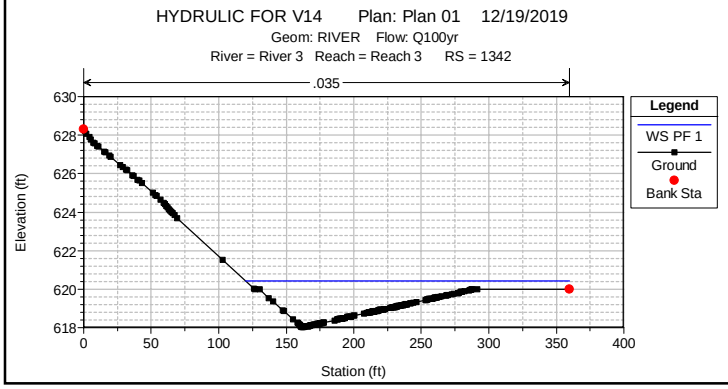

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 3 Reach = Reach 3 RS = 2611
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

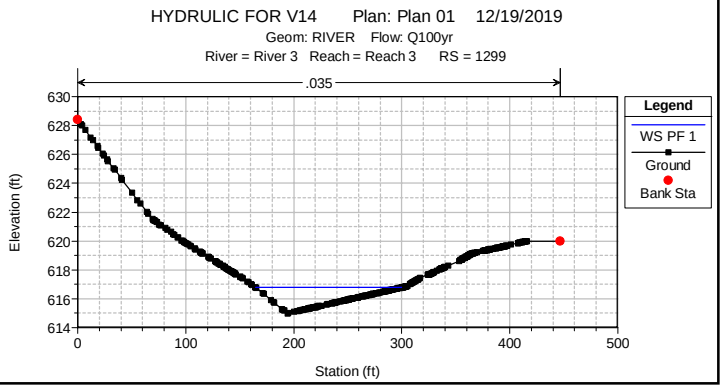

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 3 Reach = Reach 3 RS = 2264
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

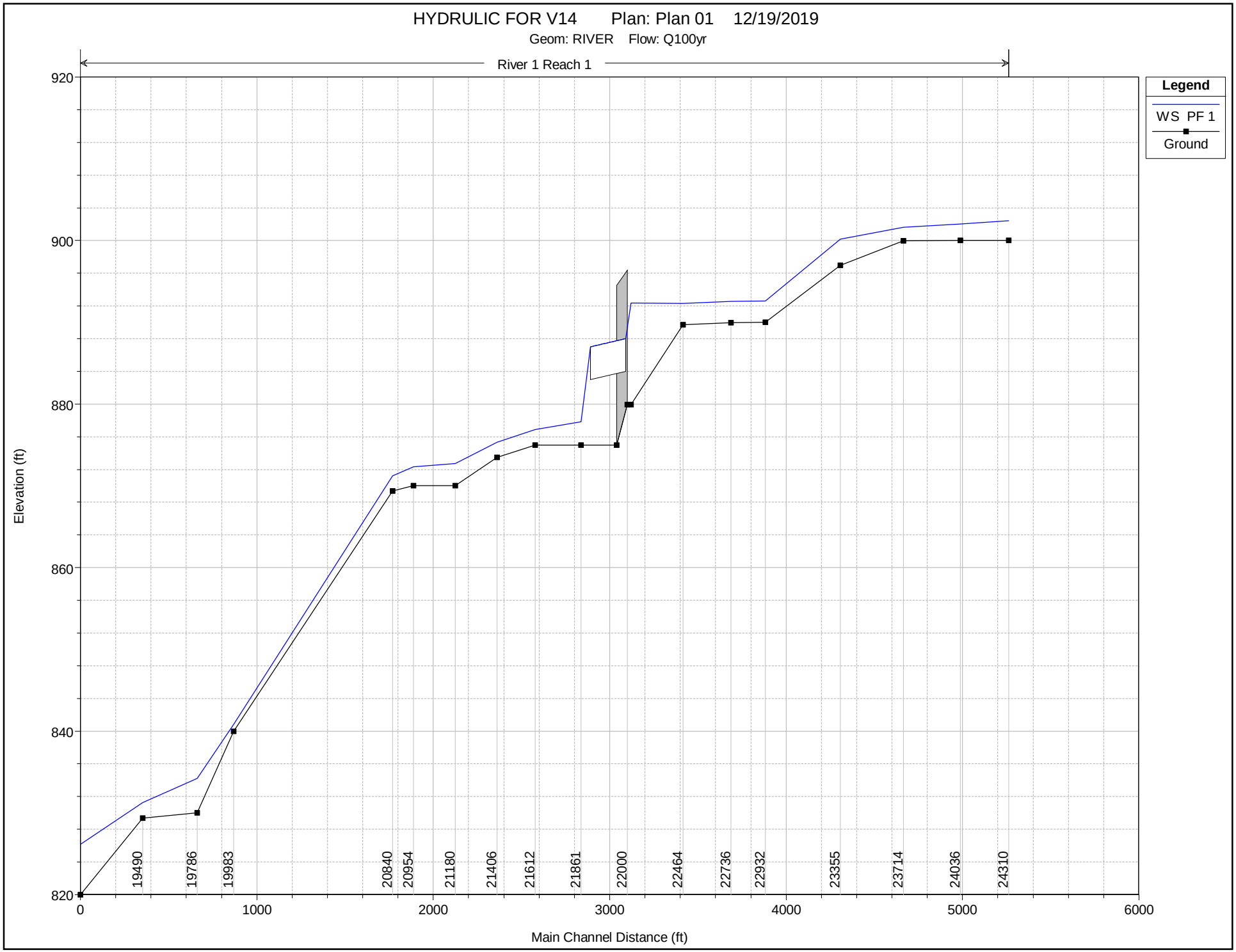

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 3 Reach = Reach 3 RS = 1848
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

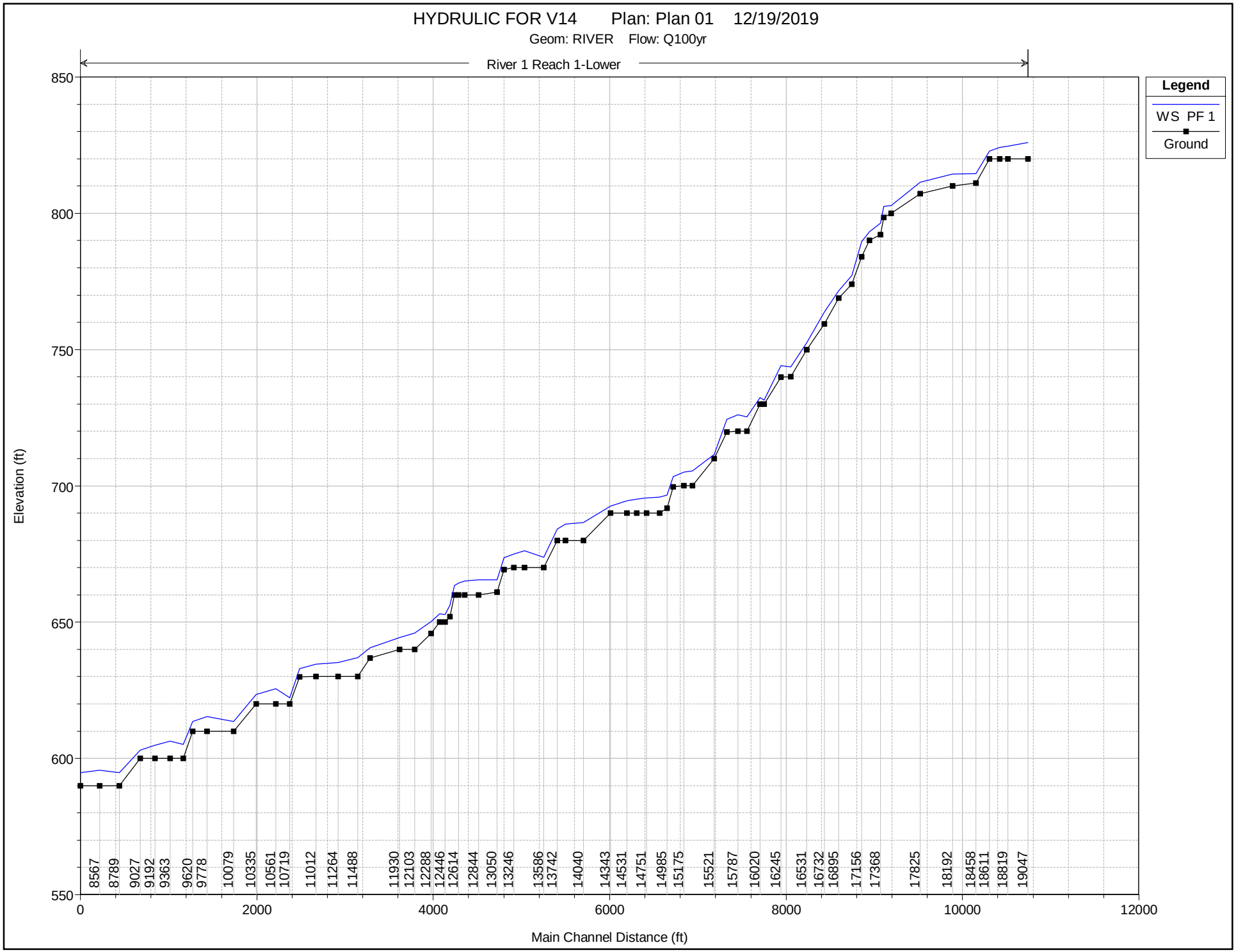

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 3 Reach = Reach 3 RS = 1670
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

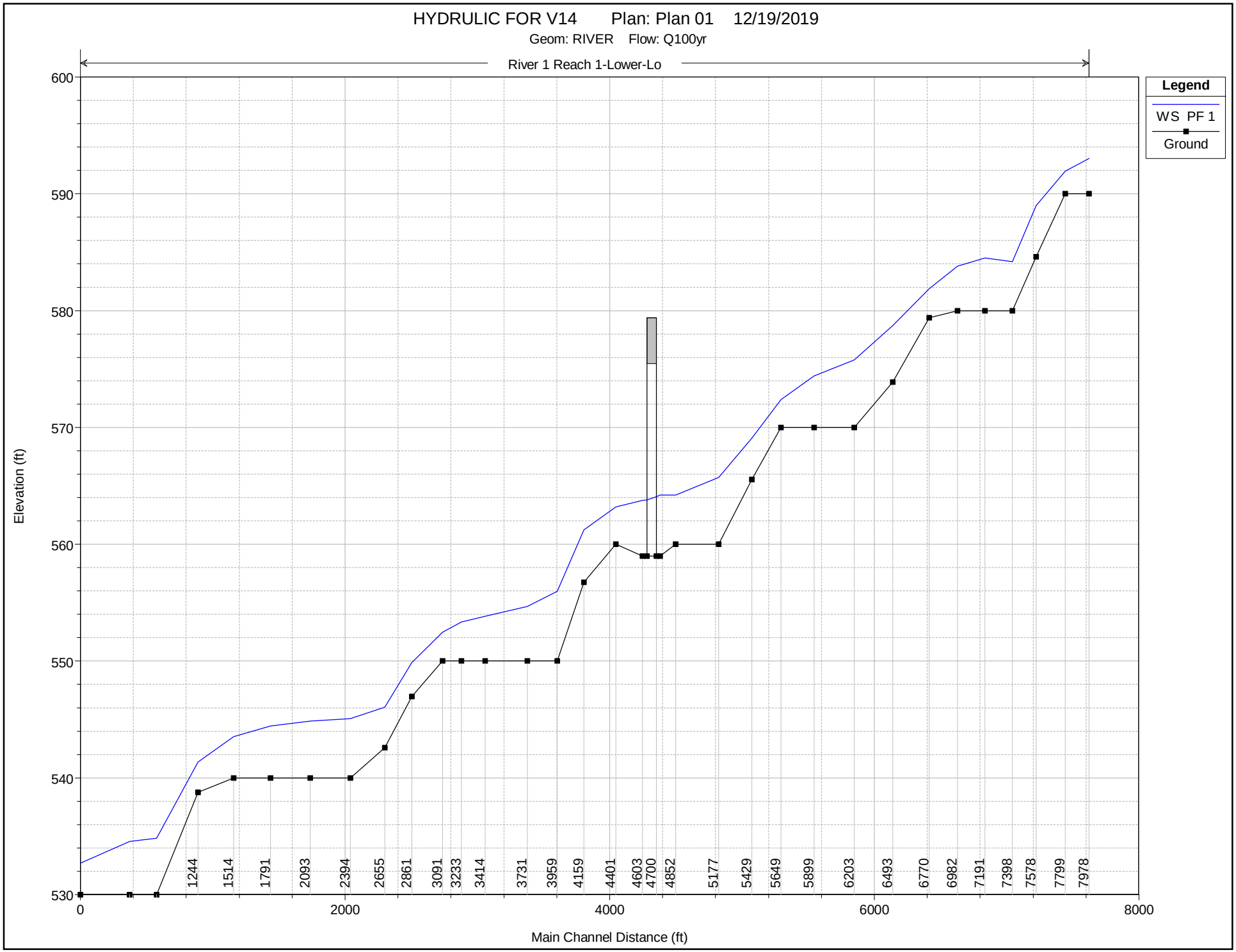

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 3 Reach = Reach 3 RS = 1389
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

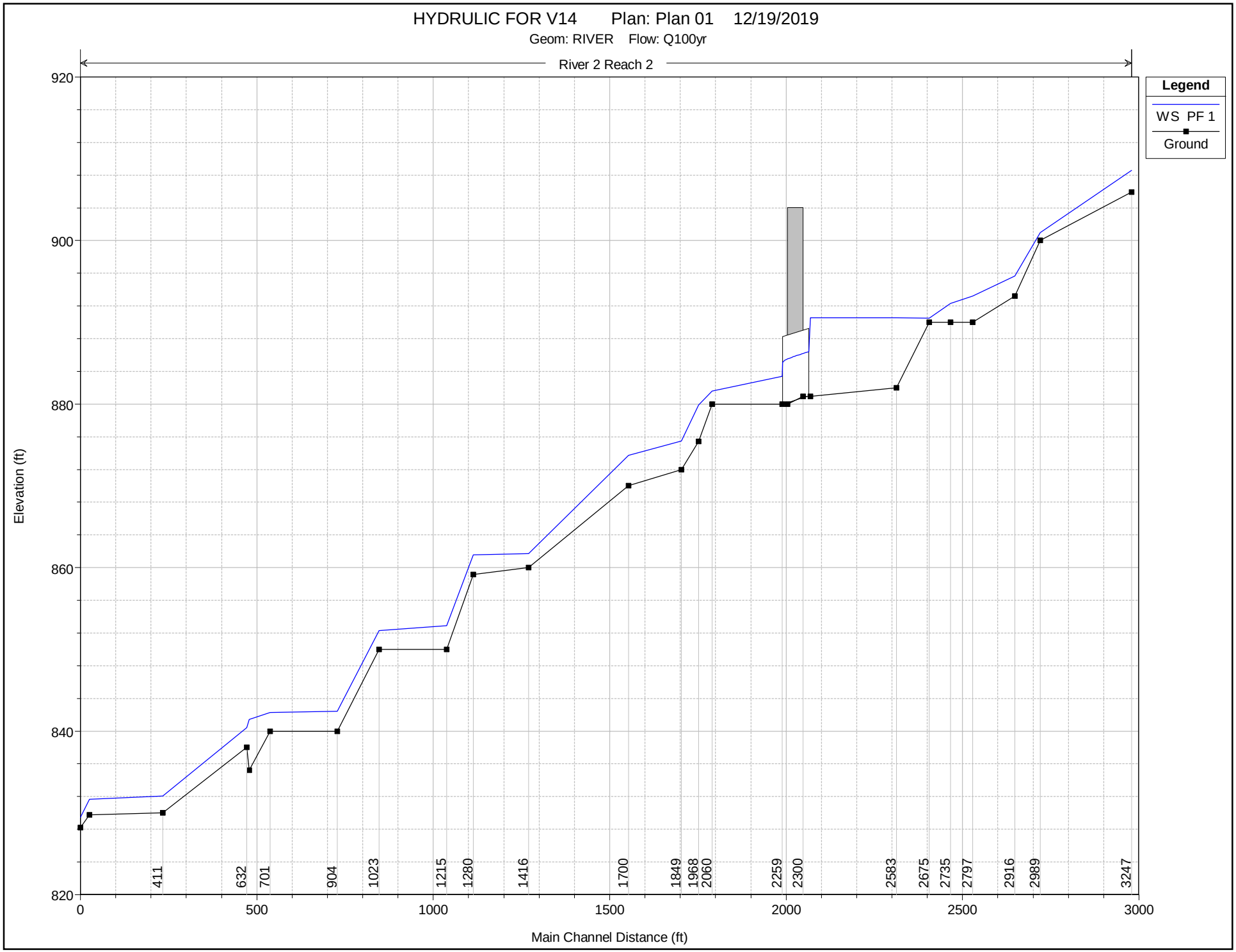

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 3 Reach = Reach 3 RS = 1342
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

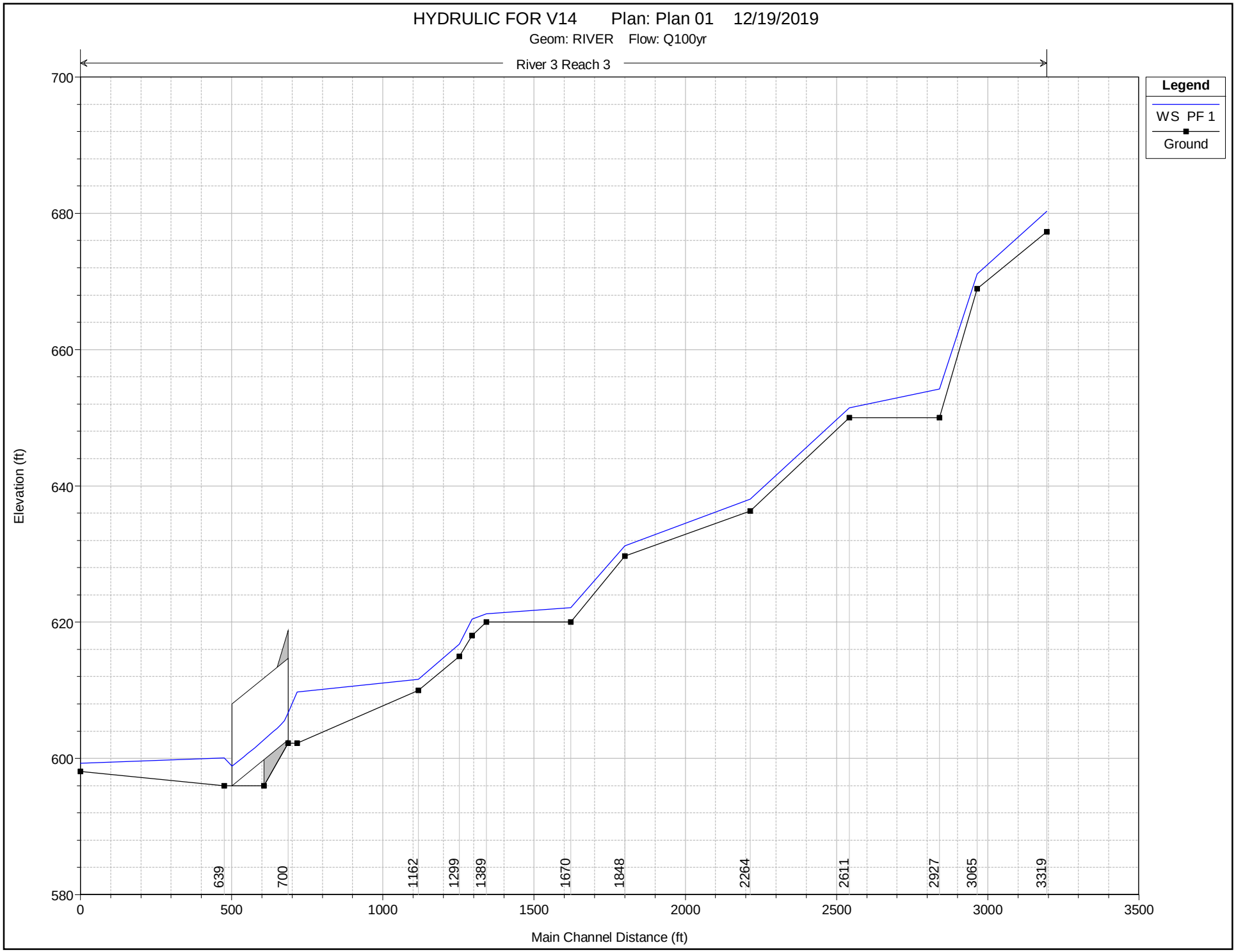

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 3 Reach = Reach 3 RS = 1299
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

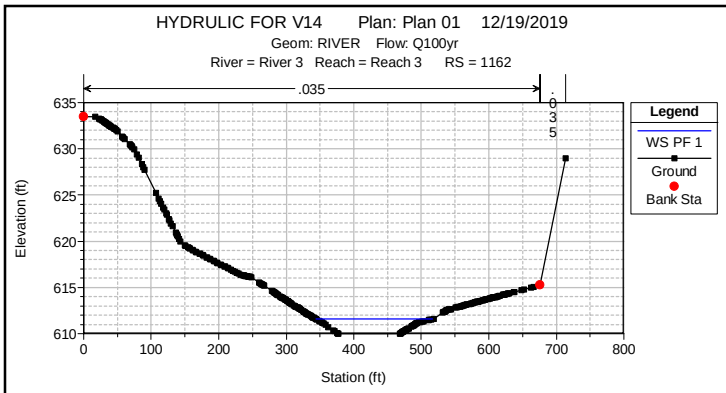

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River 1 Reach 1
Legend
WS PF 1
Ground
Elevation (ft)
920
900
880
860
840
820
0
1000
2000
3000
4000
5000
6000
Main Channel Distance (ft)
19490
19786
19983
20840
20954
21180
21406
21612
21861
22000
22464
22736
22932
23355
23714
24036
24310

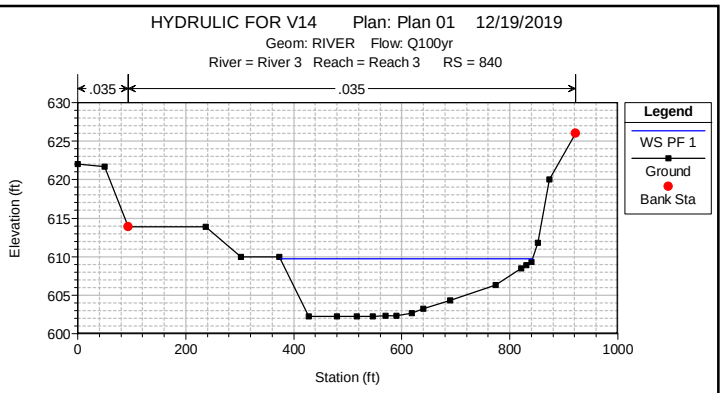

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River 1 Reach 1-Lower
Legend
WS PF 1
Ground
Elevation (ft)
850
800
750
700
650
600
550
0
2000
4000
6000
8000
10000
12000
Main Channel Distance (ft)
8567
8789
9027
9192
9363
9620
9778
10079
10335
10561
10719
11012
11264
11488
11930
12103
12288
12446
12614
12844
13050
13246
13586
13742
14040
14343
14531
14751
14985
15175
15521
15787
16020
16245
16531
16732
16895
17156
17368
17825
18192
18458
18611
18819
19047

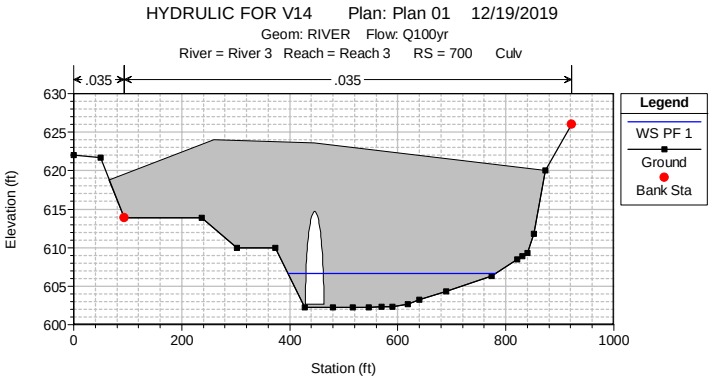

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River 1 Reach 1-Lower-Lo
Legend
WS PF 1
Ground
Elevation (ft)
600
590
580
570
560
550
540
530
0
2000
4000
6000
8000
Main Channel Distance (ft)
1244
1514
1791
2093
2394
2655
2861
3091
3233
3414
3731
3959
4159
4401
4603
4700
4852
5177
5429
5649
5899
6203
6493
6770
6982
7191
7398
7578
7799
7978

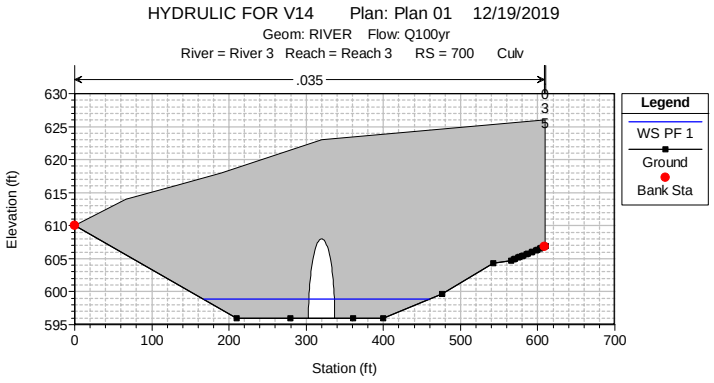

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River 2 Reach 2
Legend
WS PF 1
Ground
Elevation (ft)
920
900
880
860
840
820
0
500
1000
1500
2000
2500
3000
Main Channel Distance (ft)
411
632
701
904
1023
1215
1280
1416
1700
1849
1968
2060
2259
2300
2583
2675
2735
2797
2916
2989
3247

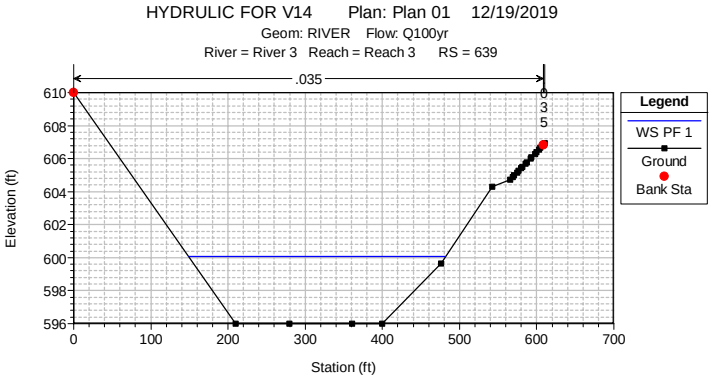

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River 3 Reach 3
Legend
WS PF 1
Ground
Elevation (ft)
700
680
660
640
620
600
580
0
500
1000
1500
2000
2500
3000
3500
Main Channel Distance (ft)
639
700
1162
1299
1389
1670
1848
2264
2611
2927
3065
3319

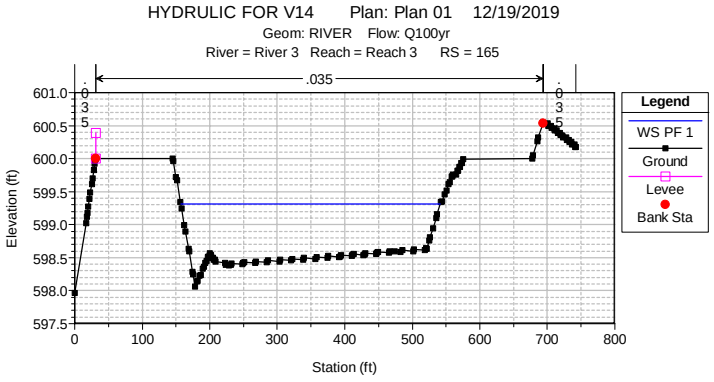

HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 3 Reach = Reach 3 RS = 1162
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 3 Reach = Reach 3 RS = 840
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 3 Reach = Reach 3 RS = 700 Culv
.035
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 3 Reach = Reach 3 RS = 700 Culv
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 3 Reach = Reach 3 RS = 639
.035
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


HYDRULIC FOR V14 Plan: Plan 01 12/19/2019
Geom: RIVER Flow: Q100yr
River = River 3 Reach = Reach 3 RS = 165
.035
Legend
WS PF 1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, Dec 2 2019

Hydraulics for Crossing J001

Invert Elev Dn (ft)	=	883.00
Pipe Length (ft)	=	200.00
Slope (%)	=	0.50
Invert Elev Up (ft)	=	884.00
Rise (in)	=	48.0
Shape	=	Box
Span (in)	=	120.0
No. Barrels	=	3
n-Value	=	0.013
Culvert Type	=	Flared Wingwalls
Culvert Entrance	=	30D to 75D wingwall flares
Coeff. K,M,c,Y,k	=	0.026, 1, 0.0347, 0.81, 0.4

Embankment

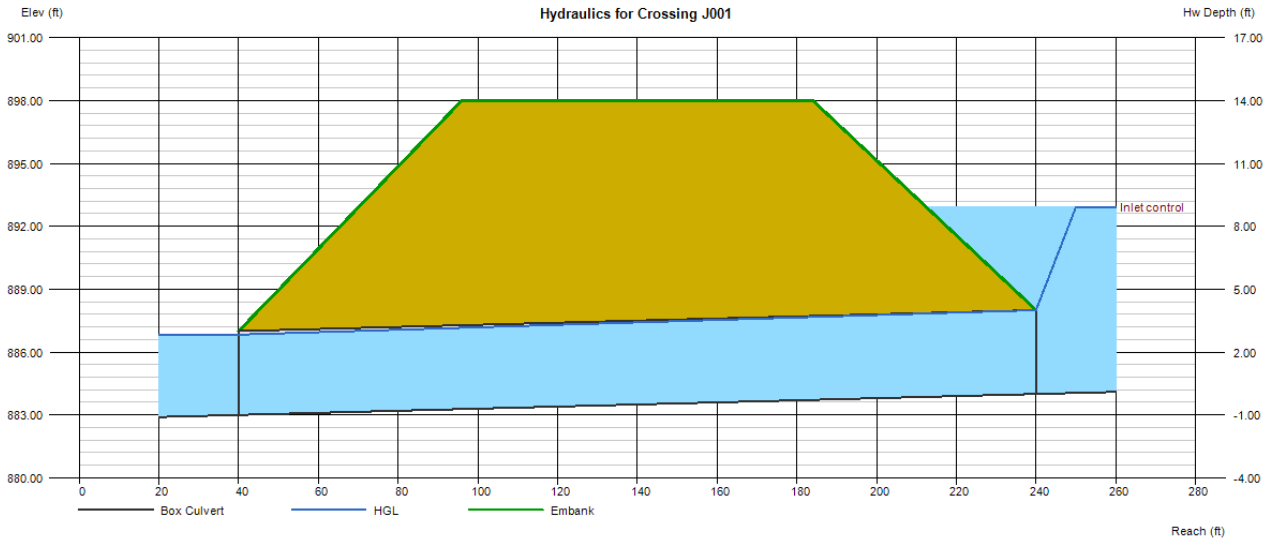
Top Elevation (ft)	=	898.00
Top Width (ft)	=	88.00
Crest Width (ft)	=	150.00

Calculations

Qmin (cfs)	=	1536.00
Qmax (cfs)	=	1536.00
Tailwater Elev (ft)	=	Normal

Highlighted

Qtotal (cfs)	=	1536.00
Qpipe (cfs)	=	1536.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	13.37
Veloc Up (ft/s)	=	12.80
HGL Dn (ft)	=	886.83
HGL Up (ft)	=	888.00
Hw Elev (ft)	=	892.92
Hw/D (ft)	=	2.23
Flow Regime	=	Inlet Control



Plan: Plan 04 River 2 Reach 2 RS: 2300 Culv Group: J002 Profile: PF 1

Q Culv Group (cfs)	1466.00	Culv Full Len (ft)	74.00
# Barrels	1	Culv Vel US (ft/s)	13.32
Q Barrel (cfs)	1466.00	Culv Vel DS (ft/s)	13.98
E.G. US. (ft)	890.56	Culv Inv El Up (ft)	881.00
W.S. US. (ft)	890.54	Culv Inv El Dn (ft)	880.00
E.G. DS (ft)	883.62	Culv Frctn Ls (ft)	1.03
W.S. DS (ft)	883.40	Culv Exit Loss (ft)	4.53
Delta EG (ft)	6.94	Culv Entr Loss (ft)	1.38
Delta WS (ft)	7.14	Q Weir (cfs)	
E.G. IC (ft)	890.08	Weir Sta Lft (ft)	
E.G. OC (ft)	890.56	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	886.42	Weir Max Depth (ft)	
Culv WS Outlet (ft)	885.12	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	5.42	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	5.12	Min El Weir Flow (ft)	904.05

Plan: Plan 04 River 3 Reach 3 RS: 700 Culv Group: J006 Profile: PF 1

Q Culv Group (cfs)	1515.00	Culv Full Len (ft)	185.00
# Barrels	1	Culv Vel US (ft/s)	11.48
Q Barrel (cfs)	1515.00	Culv Vel DS (ft/s)	15.76
E.G. US. (ft)	609.73	Culv Inv El Up (ft)	602.70
W.S. US. (ft)	609.72	Culv Inv El Dn (ft)	596.00
E.G. DS (ft)	600.10	Culv Frctn Ls (ft)	5.99
W.S. DS (ft)	600.07	Culv Exit Loss (ft)	2.61
Delta EG (ft)	9.62	Culv Entr Loss (ft)	1.02
Delta WS (ft)	9.65	Q Weir (cfs)	
E.G. IC (ft)	608.67	Weir Sta Lft (ft)	
E.G. OC (ft)	609.73	Weir Sta Rgt (ft)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (ft)	606.66	Weir Max Depth (ft)	
Culv WS Outlet (ft)	598.85	Weir Avg Depth (ft)	
Culv Nml Depth (ft)	2.85	Weir Flow Area (sq ft)	
Culv Crt Depth (ft)	3.96	Min El Weir Flow (ft)	618.77

Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Nov 22 2019

Hydraulics for crossing J007

Invert Elev Dn (ft)	=	572.00
Pipe Length (ft)	=	100.00
Slope (%)	=	3.00
Invert Elev Up (ft)	=	575.00
Rise (in)	=	48.0
Shape	=	Box
Span (in)	=	144.0
No. Barrels	=	2
n-Value	=	0.013
Culvert Type	=	Flared Wingwalls
Culvert Entrance	=	30D to 75D wingwall flares
Coeff. K,M,c,Y,k	=	0.026, 1, 0.0347, 0.81, 0.4

Embankment

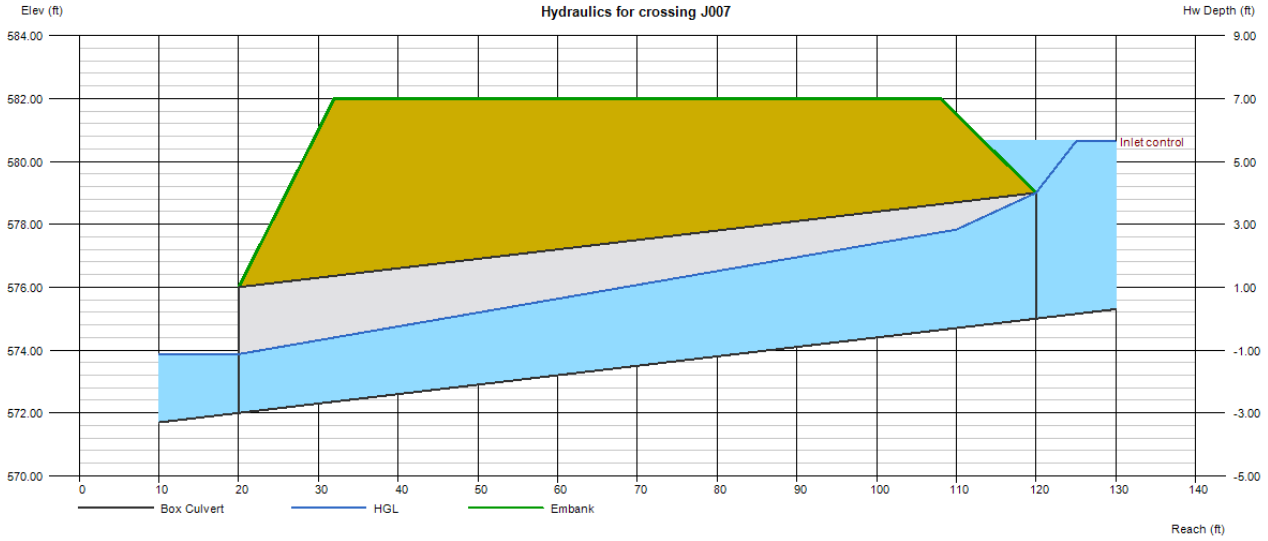
Top Elevation (ft)	=	582.00
Top Width (ft)	=	76.00
Crest Width (ft)	=	0.00

Calculations

Qmin (cfs)	=	807.00
Qmax (cfs)	=	807.00
Tailwater Elev (ft)	=	Normal

Highlighted

Qtotal (cfs)	=	807.00
Qpipe (cfs)	=	807.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	17.98
Veloc Up (ft/s)	=	10.28
HGL Dn (ft)	=	573.87
HGL Up (ft)	=	578.27
Hw Elev (ft)	=	580.63
Hw/D (ft)	=	1.41
Flow Regime	=	Inlet Control



Plan: Plan 04 River 1 Reach 1-Lower-Lo RS: 4700 Profile: PF 1 Name: J008

E.G. US. (ft)	570.61	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	570.58	E.G. Elev (ft)	570.41	569.83
Q Total (cfs)	10431.00	W.S. Elev (ft)	568.50	566.57
Q Bridge (cfs)	10431.00	Crit W.S. (ft)	566.57	566.57
Q Weir (cfs)		Max Chl Dpth (ft)	9.50	7.57
Weir Sta Lft (ft)		Vel Total (ft/s)	11.09	14.49
Weir Sta Rgt (ft)		Flow Area (sq ft)	940.82	719.80
Weir Submerg		Froude # Chl	0.69	1.00
Weir Max Depth (ft)		Specif Force (cu ft)	7778.64	7276.96
Min El Weir Flow (ft)	583.51	Hydr Depth (ft)	7.97	6.53
Min El Prs (ft)	577.00	W.P. Total (ft)	122.50	113.84
Delta EG (ft)	6.48	Conv. Total (cfs)	155483.7	104493.8
Delta WS (ft)	6.82	Top Width (ft)	118.01	110.27
BR Open Area (sq ft)	2038.00	Frctn Loss (ft)	0.45	0.16
BR Open Vel (ft/s)	14.49	C & E Loss (ft)	0.14	0.87
BR Sluice Coef		Shear Total (lb/sq ft)	2.16	3.93
BR Sel Method	Energy only	Power Total (lb/ft s)	23.93	57.00

Culvert Report

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Hydraulics for crossing PVR3

Invert Elev Dn (ft)	=	550.00
Pipe Length (ft)	=	170.00
Slope (%)	=	5.88
Invert Elev Up (ft)	=	560.00
Rise (in)	=	72.0
Shape	=	Box
Span (in)	=	72.0
No. Barrels	=	3
n-Value	=	0.013
Culvert Type	=	Flared Wingwalls
Culvert Entrance	=	30D to 75D wingwall flares
Coeff. K,M,c,Y,k	=	0.026, 1, 0.0347, 0.81, 0.4

Embankment

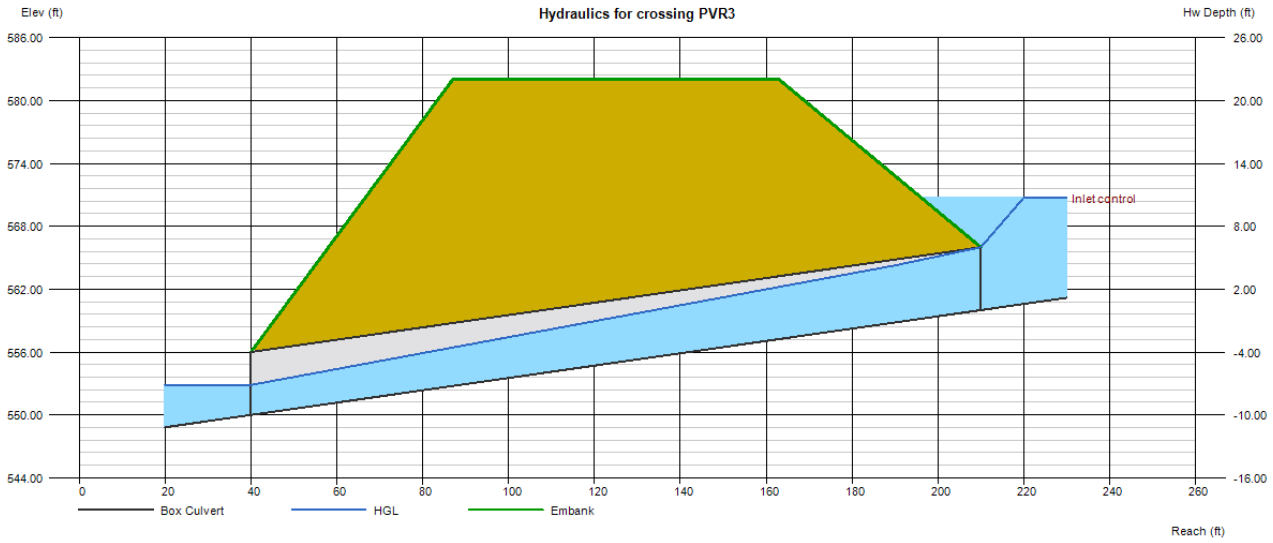
Top Elevation (ft)	=	582.00
Top Width (ft)	=	76.00
Crest Width (ft)	=	0.00

Calculations

Qmin (cfs)	=	1425.00
Qmax (cfs)	=	1425.00
Tailwater Elev (ft)	=	Normal

Highlighted

Qtotal (cfs)	=	1425.00
Qpipe (cfs)	=	1425.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	27.68
Veloc Up (ft/s)	=	13.68
HGL Dn (ft)	=	552.86
HGL Up (ft)	=	565.79
Hw Elev (ft)	=	570.72
Hw/D (ft)	=	1.79
Flow Regime	=	Inlet Control



CHAPTER 8

8.1. Reference Regarding Sediment Transport Capacity

Sediment Transport Capacity of Overland Flow

P. Y. Julien, D. B. Simons

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ABSTRACT

OVERLAND flow runoff can be either laminar or turbulent depending on the Reynolds number. The rate of soil erosion may be limited by the sediment transport capacity which depends on the type of flow. Sediment transport equations based on velocity were found to give different results than those based on shear stress. Most of the sediment transport equations developed for turbulent streams should not be applied to soil erosion by overland flow. A general relationship supported by dimensional analysis was derived. The recommended sediment transport capacity relationship can be written as a power function of slope and discharge and the range of exponents was defined from empirical relationships.

INTRODUCTION

Soil erosion by rainfall is one of the major hazards threatening the productivity of farmlands. The physical processes governing the movement of sediments by rainfall are very complex. The rate of soil erosion depends mainly on the detachment of soil particles and on the transporting capacity of overland runoff. Several sediment transport equations and soil loss relationships have been developed both from experimental studies in laboratories under simulated rainfall (Kilinc, 1972) and from statistical and regression analysis using field data (Wischmeier and Smith, 1978). Recently, some researchers have recommended the use of well-known bed-load equations to predict soil erosion losses from overland flow. For example, Komura (1976) used the Kalinske-Brown relationship and obtained fair agreement with observed data though his data set was relatively limited. The Meyer-Peter and Muller equation has also been suggested by Li (1979) for overland flow. Several sediment transport equations have been examined by Alonso, Neibling and Foster (1981) to determine how well they fit observed data on concave slopes.

Fundamental relationships for sediment transport in turbulent stream flows have been used as a basis for the analysis of sediment transport capacity by overland flow. However, since sheet flows are generally classified as laminar a theoretical analysis is required in order to determine if a sediment transport formula derived for turbulent streamflow is also applicable to laminar sheet flow.

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Therefore, the purpose of this study was to investigate the applicability of several sediment transport equations under various hydraulic conditions, including laminar sheet flow. In the first part of this paper, the hydraulic characteristics relevant to sediment transport are summarized to clearly point out the differences between turbulent and laminar flows. Then several sediment transport formulas valid for turbulent streamflow are examined under laminar sheet flow conditions. These transformed relationships are compared with regression equations obtained from experimental studies of soil erosion.

OVERLAND FLOW CHARACTERISTICS

In natural fields, overland flow occurs when the rainfall intensity is in excess of the infiltration rate of the soil. A very thin film of water covers the soil surface and it is referred to as the laminar sheet flow. As the runoff rate increases downslope, the flow converges into micro-scale channels called rills which gradually develop until they form large-scale channels called gullies. In a recent study, Thorne (1984) also defined ephemeral gullies in arable fields. These gullies are formed by the concentraiton of surface runoff and are obliterated each year by normal tillage.

Gully, rill and sheet runoff have different hydraulic properties depending on the relative magnitude of inertia and viscous forces. The ratio of these two types of forces defines the Reynolds number Re. When the inertia forces largely overcome the viscous forces, such as flows in rivers and gullies, the Reynolds number is large and the flow is turbulent. In the case of thin overland runoff, the viscous forces overcome the inertia forces and the flow is called laminar. In sheet flows, perturbations induced by raindrop impact and surface roughness are greatly attenuated due to the large magnitude of viscous forces at low Reynolds numbers. These forces damp out the velocity fluctuations caused by these disturbances and sheet flows over rough boundaries remain laminar until a critical value of the Reynolds number is exceeded.

Another major difference between stream flow and sheet flow is related to the flow depth. For a given particle size, the transport of sediments by saltation and suspension in overland flow is very limited due to the reduced flow depth. The bed load movement, however, may predominate and the most accurate sediment transport rates might be given by bed-load equations, the validity of this statement being precisely the purpose of this investigation.

The principal variables describing overland flow are shown in Fig. 1. The main geometric variables are slope length L and gradient S. The hydraulic variables are rainfall intensity i, flow depth h, mean velocity $\bar{u}$, unit water discharge q and thickness of the laminar sublayer δ'. The parameter generally associated with the sediment discharge q_s is bed shear stress τ_o; the other properties

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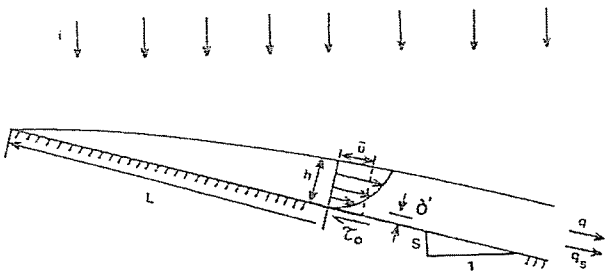


Fig. 1—Overland flow variables.

being gravitational acceleration g, kinematic viscosity ν and specific mass of water ρ.

Fundamental Equations

Two nonlinear partial differential equations derived by de Saint-Venant are generally used to solve the problem of gradually varied unsteady flows. These are the continuity relationship describing the conservation of mass and the momentum equation which is a force equilibrium relationship. In the case of steady overland flow, the continuity equation reduces to:

$$q = \bar{u}\, h \quad \ldots\ldots [1]$$

Considering the principal terms of the momentum equation, the kinematic wave approximation has been recommended by Wooding (1965) and Woolhiser (1975). This approximation states that the slope of the energy line is equal to the soil surface slope, or:

$$S = S_f \quad \ldots\ldots [2]$$

in which S_f is the slope of the energy line or friction slope.

The slope of the energy line can be defined by the Darcy-Weisbach relationship:

$$S_f = \frac{f}{8}\frac{\bar{u}^2}{gh} \quad \ldots\ldots [3]$$

where f is the Darcy-Weisbach friction factor.

The friction factor f is a function of the Reynolds number and the relative roughness for turbulent flows. The Reynolds number is defined as:

$$Re = \frac{\bar{u}\, h}{\nu} \quad \ldots\ldots [4]$$

As the Reynolds number increases, the flow becomes turbulent and the friction factor is then a function of the roughness of the surface. The roughness of the boundary depends on the sediment size d_s and the thickness of the laminar sublayer δ'. Two important variables are associated with the thickness of the boundary sublayer δ'. These are bed shear stress τ_o and shear velocity U_*. These variables are defined as:

$$\tau_o = \rho g h S_f \quad \ldots\ldots [5]$$

$$U_* = \sqrt{\frac{\tau_o}{\rho}} \quad \ldots\ldots [6]$$

$$\delta' = \frac{11.6\,\nu}{U_*} \quad \ldots\ldots [7]$$

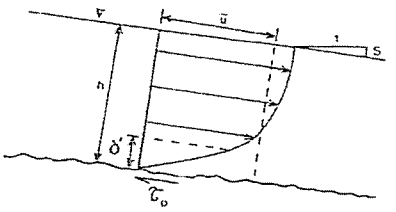


Fig. 2—Turbulent flow over a smooth surface.

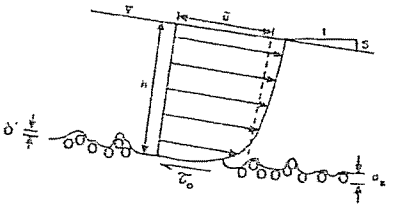


Fig. 3—Turbulent flow over a rough surface.

The ratio of sediment size d_s to the thickness of the laminar sublayer δ' delineates two types of turbulent flow conditions shown in Figs. 2 and 3 for smooth and rough boundaries respectively.

From combining equations [5], [6], and [7], the ratio δ'/d_s is:

$$\frac{\delta'}{d_s} = \frac{11.6\,\nu}{d_s\sqrt{ghS_f}} \quad \ldots\ldots [8]$$

This parameter and the Reynolds number are used to define the type of overland flow.

Overland Flow Types

The four principal types of flow relevant to this investigation on soil erosion by overland flow are: (a) laminar sheet flow; (b) turbulent smooth flow governed by the Blasius equation; (c) turbulent rough flow (Manning equation); and (d) turbulent rough flow with very small relative roughness (Chezy equation). This last flow type is not very likely to occur in overland flow. However, it has been included in this analysis since it represents a limiting case for which the Darcy-Weisbach friction factor remains constant. For steady flow conditions, the principal variables related to soil erosion ($\bar{u}$, h and τ_o) are defined as a function of slope and water discharge.

Laminar Flow

In laminar flows with raindrop impact the Darcy-Weisbach friction factor f is related to: (a) the Reynolds number Re, (b) the surface friction coefficient k_o without raindrop impact, and (c) two empirical coefficients A and b for raindrop impact. The following relationship is generally used:

$$f = \frac{K}{Re} = \frac{k_o + Ai^b}{Re} \quad \ldots\ldots [9]$$

The values of k_o have been tabulated by Woolhiser (1975) for various surface types and the value $k_o = 24$ is representative of the smooth surface condition. Experimental coefficients A and b have been obtained by Izzard (1944), Li (1972), and Fawkes (1972), and these

TABLE 1. RESISTANCE COEFFICIENTS A AND b FOR RAINFALL.

Reference	A†	b
Izzard (1944)	750	1.33
Li (1972)	118	0.4
Fawkes (1972)	393	1.0

†For i in m per hour.

values are indicated in Table 1. The experimental values of the friction coefficient f obtained by Shen and Li (1973) indicate that for a bare smooth surface, the flow is laminar for Re < 900 and the Blasius law is valid for turbulent smooth flows when Re > 2000. Chen's data (1976) show that k_o can be as large as 50,000 for vegetated surfaces and laminar flow conditions were observed for Reynolds numbers as large as 10^5.

At low Reynolds numbers, the friction parameter K for sheet flows is constant, and the Darcy-Weisbach equation is given by:

$$S_f = \left(\frac{K\nu}{\bar{u}\,h}\right)\frac{\bar{u}^2}{8gh} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots [10]$$

The variables $\bar{u}$, h, and τ_o for laminar sheet flows derived from equations [1], [2], [5], and [10] are summarized in Table 2 for comparison with similar relationships valid under turbulent conditions.

Turbulent Flow over a Smooth Surface

For bare soil surfaces the flow becomes turbulent when Re > 2000 and the flow is called hydraulically smooth when the thickness of the laminar sublayer given by equation [7] is much in excess of the size of soil particles

TABLE 2. SUMMARY OF FLOW CHARACTERISTICS (VELOCITY, DEPTH, AND SHEAR STRESS).

Velocity $\bar{u} = c\,S^a\,q^d$			
Type of flow	c	a	d
Laminar (K = constant)	$\left(\frac{8g}{K\nu}\right)^{0.333}$	0.333	0.667
Turbulent, smooth boundary	$\left(\frac{8g}{0.316}\right)^{0.333}\nu^{-0.083}$	0.333	0.417
Turbulent (n = constant)	$\left(\frac{1}{n}\right)^{0.6}$	0.3	0.4
Turbulent (f = constant)	$\left(\frac{8g}{f}\right)^{0.333}$	0.333	0.333
Depth $h = c\,S^a\,q^d$			
Type of flow	c	a	d
Laminar (K = constant)	$\left(\frac{K\nu}{8g}\right)^{0.333}$	-0.333	0.333
Turbulent, smooth boundary	$\left(\frac{0.316}{8g}\right)^{0.333}\nu^{0.083}$	-0.333	0.583
Turbulent (n = constant)	$n^{0.6}$	-0.3	0.6
Turbulent (f = constant)	$\left(\frac{f}{8g}\right)^{0.333}$	-0.333	0.667
Shear stress $\tau_o = c\,S^a\,q^d$			
Type of flow	c	a	d
Laminar (K = constant)	$\rho g\left(\frac{K\nu}{8g}\right)^{0.333}$	0.667	0.333
Turbulent, smooth boundary	$\rho g\left(\frac{0.316}{8g}\right)^{0.333}\nu^{0.083}$	0.667	0.583
Turbulent (n = constant)	$\rho g\, n^{0.6}$	0.7	0.6
Turbulent (f = constant)	$\rho g\left(\frac{f}{8g}\right)^{0.333}$	0.667	0.667

($\delta' > 3\,d_s$). In this case, Keulegan (1938) derived an equation similar to the von Karman-Prandtl logarithmic equation. When the Reynolds number is not too large, this equation can be approximated by the Blasius equation for which the Darcy-Weisbach friction factor becomes:

$$f = \frac{0.316}{Re^{0.25}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots [11]$$

For turbulent flows over a smooth surface, the variables $\bar{u}$, h and τ_o given in Table 2 are derived from equations [1], [2], [3], [5], and [11]. The exponents of S for these three variables are identical to those obtained for laminar sheet flows.

Turbulent Flow over a Rough Surface

For turbulent flows an increase of the Reynolds number (or water discharge) raises the water level, and decreases the relative roughness and the friction factor. When the thickness of the laminar sublayer is small compared to sediment size ($\delta' < 5\,d_s$), the flow is hydraulically rough and the logarithmic equation given by Keulegan (1938) applies. The friction coefficient is defined as:

$$\sqrt{\frac{8g}{f}} = C = c_1 \log c_2 \frac{h}{d_s} \quad \ldots\ldots\ldots\ldots\ldots\ldots [12]$$

Approximate power relationships such as the Manning equation, however, are frequently used by hydraulic engineers. Since both equations give similar results for open channel flows without bedforms when the relative roughness ranges between 10 and 10000, the Manning equation (SI units) is used in this study. The equivalent Darcy-Weisbach f is then:

$$\sqrt{\frac{8g}{f}} = \frac{h^{1/6}}{n} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots [13]$$

in which n is the Manning roughness coefficient. The well-known Manning-Strickler relationship gives the proportionality between the median size of the sediment particles (in mm) at the boundary and the Manning roughness coefficient:

$$n = 0.0132\,d_s^{1/6} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots [14]$$

The combination of equations [1], [2], [3], [5], and [13] gives the relationships for $\bar{u}$, h, and τ_o shown in Table 2 for turbulent rough conditions (n = constant).

When the relative roughness becomes extremely small, the Darcy-Weisbach equation is equivalent to the Chézy equation ($f = 8g/C^2$). Both coefficients f and C are constant and after combining equations [1], [2], [3], and [5], the variables $\bar{u}$, h, and τ_o are written as a function of S and q. The resulting expressions are listed in Table 2. The relationship $\tau_o \propto \bar{u}^2$ is valid for the Chézy equation and the exponents are slightly different from those derived for the Manning relationship. The exponents of q and S of the velocity relationship are identical and equal to 0.333.

Discussion

The results of this analysis of the hydraulic characteristics are summarized in Table 2. The velocity, the flow depth, and the bed shear stress are written in

terms of discharge and slope. The exponent of the slope does not vary significantly for different flow conditions ranging from laminar to turbulent. The exponents of the slope for velocity, flow depth, and bed shear stress are respectively 0.33, −0.33, and 0.67. On the other hand, the exponents of the water discharge vary gradually and differ by a factor 2 between the extreme conditions. The exponents of discharge for velocity and shear stress vary in opposite directions. Indeed, for flow conditions changing from laminar to turbulent flows, the exponent of velocity varies gradually from 0.67 to 0.33 while the exponent of shear stress varies from 0.33 to 0.67. This effect is extremely important if we consider the rate of sediment transport.

SEDIMENT TRANSPORT EQUATIONS

The sediment transport capacity of overland flow under rainfall was investigated to obtain a theoretically sound relationship supported by empirical equations. The method of dimensional analysis was applied to the principal variables related to soil erosion.

Variables and Dimensional Analysis

Sheet erosion is the result of the detachment of soil particles by raindrop impact and transport by overland flow. The eroded soil particles are transported downstream by runoff and the unit sediment discharge is a function of the following variables:

$$q_s = f(L, S, i, \bar{u}, h, q, \tau_o, \tau_c, d_s, \rho_s, \rho, \nu, g) \quad \ldots\ldots [15]$$

in which τ_c is critical shear stress and d_s is size of soil particles, and the other variables are as defined previously. Among these variables, the first two (L, S) describe the geometry and the next five (i, $\bar{u}$, h, q, τ_o) are flow characteristics including rainfall intensity. The last six (τ_c, d_s, ρ_s, ρ, ν, g) are associated with soil and water properties and the gravitational acceleration. Shear stress is difficult to measure in the field and is usually computed from other variables. In a river, the variables S, $\bar{u}$, h, and q are used to describe stream flows because the velocity and depth are generally more easily measured than rainfall intensity i and runoff length L. For this reason, Laursen (1956) suggested the reduction of some sediment transport equations to a function of the variables $\bar{u}$ and h. In the case of soil erosion, however, the variables i and L have important physical significance. The slope and unit water discharge may be more easily measured than the velocity and depth. Therefore, the variables S and q may be more convenient than $\bar{u}$ and h as components of a sediment transport relationship for overland flow under steady-state condition; elimination of the variables $\bar{u}$ and h from the Darcy-Weisbach and the continuity equation $q = \bar{u}h$ is possible.

The critical shear stress value τ_c corresponds to the beginning of motion of the sediment particles. Its evaluation remains a complex problem requiring further investigation, but the fundamental relationship defining the incipient motion of sediments indicates that the critical shear stress is a function of the particle size and the specific masses of water and sediment. Therefore, the sediment size can be replaced by the critical shear stress in a sediment transport equation. The specific masses of water and sediment are nearly constant for particle sizes ranging from clays to gravels. In the case of aggregates, equivalent conditions of shear stress can be defined, for example, using an equivalent diameter, while keeping the same specific mass of sediment in the analysis.

Using these relationships and assuming ρ_s constant, equation [15] reduces to:

$$f(q_s, q, i, L, \rho, \nu, \tau_c/\tau_o, S) = 0 \quad \ldots\ldots [16]$$

The following Π-terms are obtained from dimensional analysis after L, ρ, and ν are selected as repeating variables:

$$f\left(\frac{q_s}{\rho\nu}, \frac{q}{\nu}, \frac{iL}{\nu}, \frac{\tau_c}{\tau_o}, S\right) = 0 \quad \ldots\ldots [17]$$

The sediment transport term can be written as a function of the product of the other Π-terms in the form:

$$\left(\frac{q_s}{\rho\nu}\right) = \bar{\alpha}\ S^{\beta}\left(\frac{q}{\nu}\right)^{\gamma}\left(\frac{iL}{\nu}\right)^{\delta}\left(1 - \frac{\tau_c}{\tau_o}\right)^{\epsilon} \quad ; \text{for } \tau_o > \tau_c \quad \ldots\ldots [18]$$

In this equation, $\bar{\alpha}$, β, γ, δ, and ε are experimental coefficients and the sediment equations based on tractive force and stream power concepts are represents by the term $1 - (\tau_c/\tau_o)$.

Under dimensional form, this equation is transformed to:

$$q_s = \alpha\, S^{\beta}\, q^{\gamma}\, i^{\delta}\, \left(1 - \frac{\tau_c}{\tau_o}\right)^{\epsilon} \quad \ldots\ldots [19]$$

in which,

$$\alpha = \frac{\bar{\alpha}\rho L^{\delta}}{\rho^{\gamma+\delta-1}} \quad \ldots\ldots [20]$$

The derivation by Julien (1982) gives a general relationship between the sediment discharge and the dominant geometry and flow variables. The first three factors (S, q, i) represent the potential erosion or transport capacity by overland flow, which is reduced by the last factor reflecting the soil resistance to erosion. When τ_c remains small compared to τ_o, the equation for sediment transport capacity is:

$$q_s = \alpha\, S^{\beta}\, q^{\gamma}\, i^{\delta} \quad \ldots\ldots [21]$$

The sediment transport capacity by turbulent flows in deep channels is not a function of the rainfall intensity, and therefore, $\delta = 0$ in this case.

Empirical Equations

Several empirical equations can be transformed to evaluate the coefficients α, β, γ, δ, and ε. Among the equations analyzed those proposed by Musgrave (1957), Li, Shen and Simons (1973), and Kilinc (1972) include tractive force, stream power, velocity, and discharge relationships. When the variables differ from those of equation [19], the relationships in Table 2 are used for the transformation of $\bar{u}$, h, and τ_o for laminar flows, while the Reynolds number is replaced by $Re = \bar{u}h/\nu$. The results summarized in Table 3 suggest that none of the actual equations is complete since some coefficients are still zero. Consequently, for each particular equation, the number of variables is reduced owing to

TABLE 3. TRANSFORMATION OF EMPIRICAL EROSION EQUATIONS FOR LAMINAR FLOW

$$q_s \sim s^{\beta} q^{\gamma} i^{\delta} \left(1 - \frac{\tau_c}{\tau_o}\right)^{\varepsilon}$$

Eq. No.	Reference	Equation	α†	β	γ	δ	ε
22	Musgrave (1947)	$q_s = \alpha' S^m L^n i^p$	α'	m	n	p-n	0
23	Zingg (1940)	$q_s \sim L^{1.66} S^{1.37}$	--	1.37	1.66	-1.66	--
24	Wischmeier and Smith (1978) (S>5%)	$q_s \sim L^{1.5}$ (.00076S^2 + .0053S + .0076)	--	≅1.7	1.5	-1.5	--
25	Meyer and Monke (1965)	$q_s \sim L^{1.9} S_o^{3.5}$	--	3.5	1.9	-1.9	--
26	Young and Mutchler (1969)	$q_s \sim L^{2.24} S^{0.74}$	--	0.74	2.24	-2.24	--
27	Li et al. (1973)	$q_s = \alpha' \int_o^L \tau_o^2 \, dx$	$3\alpha' \frac{\gamma^2}{5}\left(\frac{K\nu}{8g}\right)^{2/3}$	1.33	1.67	-1	0
28	Komura (1983)	$q_s \sim q^{11/8} i^{1/2} S^{1.5}$	--	1.5	1.38	0.5	0
29	Kilinc (1972)	$q_s = e^{2.05}(\tau_o - \tau_c)^{2.78}$	$e^{2.05} \gamma^{2.78} \left(\frac{K\nu}{8g}\right)^{0.93}$	1.86	0.93	0	2.78
30	Kilinc (1972)	$q_s = e^{0.122}((\tau_o - \tau_c)\bar{u})^{1.67}$	$e^{0.122} \gamma^{1.67}$	1.67	1.67	0	1.67
31	Kilinc (1972)	$q_s = e^{-3.17} \bar{u}^{3.625}$	$e^{-3.17} \left(\frac{8g}{K\nu}\right)^{1.21}$	1.21	2.42	0	0
32	Kilinc (1972)	$q_s = e^{1.24} \bar{u}^{4.67} Re^{-0.878}$	$e^{1.24} \nu^{0.878} \left(\frac{8g}{K\nu}\right)^{1.56}$	1.56	2.24	0	0
33	Kilinc (1972)	$q_s = e^{-11.6} Re^{2.05} S^{1.46}$	$e^{-11.6} \nu^{-2.05}$	1.46	2.05	0	0
34	Kilinc (1972)	$q_s = e^{11.7} q^{2.035} S^{1.66}$	$e^{11.7}$	1.66	2.03	0	0

†Sediment discharge in pounds per ft-s; multiply by 1.64×10^{-3} for q_s in tons/m·s.

these zero values. The most significant parameters pointed out in this analysis are the slope S and the discharge q. The numerical values of the coefficient β vary from 1.2 to 1.9, and γ, varies from 1.4 to 2.4. The variability of these exponents indicates the complexity of the sediment transport processes since only two major parameters are considered in this analysis. These relationships are in most cases particular to a study area or to the laboratory conditions under which the data were collected. Most equations include rill erosion which also influences the rate of soil erosion.

The well-known Universal Soil Loss Equation cannot be transformed directly into the general equation since the slope factor is written in a quadratic form. The equivalent exponent, however, is expected to vary between 1 and 2, and Julien (1982) found an equivalent exponent value near 1.7 while the discharge exponent 1.5 is an approximate value mostly valid when $S > 0.05$. The Kilinc and Richardson equations cannot define the parameters δ and ε since in their experiments, the soil surface was nearly impervious and also the bed tractive force was much in excess of the critical shear stress value. Throughout these transformations, the number of independent parameters remains the same. For example, equations [23], [25], and [26] based on slope and length have only two independent parameters because $\delta = -\gamma$. This remark is also valid for equations having one independent parameter since for equation [29] $\varepsilon = 3\gamma$ and $\beta = 2\gamma$; for equation [30] $\beta = \gamma = \varepsilon$; and for equation [31] $\beta = \gamma/2$.

Further fundamental research is required to better define the exponents δ and ε. The coefficients of the general equation obtained by dimensional analysis are kept variable for the purpose of this study and equation [19] is recommended for watershed modeling. The prediction from each equation will be possible, provided the proper set of coefficients is selected from Table 3. Fair estimates can be obtained from a regression

TABLE 4. TRANSFORMED SEDIMENT TRANSPORT EQUATIONS FOR OVERLAND FLOW

$$q_s \sim s^{\beta} q^{\gamma} \left(1 - \frac{\tau_c}{\tau_o}\right)^{\varepsilon}$$

Eq. No.	Investigator	Equation	Laminar				Turbulent											
							Smooth Boundary				Manning Equation				Chezy Equation			
			β	γ	ε	Index*	β	γ	ε	Index*	β	γ	ε	Index*	β	γ	ε	Index*
36	Du Boys	$q_s \sim \tau_o(\tau_o-\tau_c)$	1.33	0.66	1	1	1.33	1.17	1	1	1.4	1.2	1	1	1.33	1.33	1	1
37	WES	$q_s \sim (\tau_o-\tau_c)^{m=1.5}$	1	0.5	1.5	0	1	0.88	1.5	0	1.05	0.90	1.5	0	1	1	1.5	0
38	Shields	$q_s \sim Sq(\tau_o-\tau_c)$	1.67	1.33	1	1	1.67	1.58	1	2	1.7	1.6	1	2	1.67	1.67	1	2
39	Schoklitsch	$q_s \sim S^{1.5}(q-q_c)$	1.5	1	--	1	1.5	1	--	1	1.5	1	--	1	1.5	1	--	1
40	Kalinske-Brown	$q_s \sim \tau_o^{2.5}$	1.67	0.83	0	1	1.67	1.46	0	2	1.75	1.5	0	2	1.67	1.67	0	2
41	Meyer-Peter et al.	$q_s \sim (\tau_o-\tau_c)^{1.5}$	1	0.5	1.5	0	1	0.88	1.5	0	1.05	0.9	1.5	0	1	1	1.5	0
42	Bagnold	$q_s \sim \tau_o^{0.5}(\tau_o-\tau_c)$	1	0.5	1	0	1	0.88	1	0	1.05	0.9	1	0	1	1	1	0
43	Engelund-Hansen	$q_s \sim \tau_o^{1.5}\bar{u}^2$	1.67	1.83	0	2	1.67	1.71	0	2	1.65	1.7	0	2	1.67	1.67	0	2
44	Inglis-Lacey	$q_s \sim \bar{u}^5 h^{-1}$	2	3	0	0	2	2.5	0	0	1.8	1.4	0	2	2	1	0	0
45	Yalin ($\tau_o \cong \tau_c$)	$q_s \sim \tau_o^{0.5}(\tau_o-\tau_c)^2$	1.67	0.83	2	1	1.67	1.46	2	2	1.75	1.5	2	2	1.67	1.67	2	2
46	Yalin ($\tau_o >> \tau_c$)	$q_s \sim \tau_o^{0.5}(\tau_o-\tau_c)$	1	0.5	1	0	1	0.88	1	0	1.05	0.9	1	0	1	1	1	0
47	Chang et al.	$q_s \sim \tau_o \bar{u}$	1	1	0	0	1	1	0	0	1	1	0	0	1	1	0	0
48	Barekyan	$q_s \sim Sq\bar{u}$	1.33	1.67	0	2	1.33	1.42	0	2	1.3	1.4	0	2	1.33	1.33	0	1
49	Pedroli	$q_s \sim \tau_o^{1.6} h^{0.2}$	1	0.6	0	0	1	1.05	0	0	1.06	1.08	0	0	1	1.2	0	0

*The index represents the number of exponents within the ranges: $1.2 < \beta < 1.9$; and $1.4 < \gamma < 2.4$.

equation such as given by Kilinc (1972). For example, excellent results were obtained by Julien (1982) with the use of the discharge and slope formula (equation 34).

The formation of rills locally increases the unit water discharge q and the resulting erosion rate is expected to be larger than for uniform flow conditions. The rill erosion data collected by Kilinc were analyzed by Julien and Simons (1984) and once the volume of rill erosion was subtracted from the total erosion, the following regression equation was obtained:

$$q_s \sim S^{1.31}\, q^{1.93}\ ;\ (R^2 = 0.96) \quad \ldots\ldots\ldots\ldots\ldots [35]$$

Both exponents for S and q are smaller than those for soil erosion including rills (equation [34]). This equation can be used for comparison with sediments transport equations for laminar sheet flow.

Applicability of Sediment Transport Equations for Turbulent Flows

Most of the well-known sediment transport equations originally derived for turbulent stream flows can be transformed to determine their applicability to natural conditions in overland flows.

This analysis included the transformation of the sediment transport equations suggested by Du Boys (1879), O'Brien-Rindlaub (1934), WES (1935), Shields (1936), Schoklitsch (1934), Kalinske-Brown (1949), Meyer-Peter and Müller (1948), Bagnold (1956), Engelund-Hansen (1967), Inglis-Lacey (1968), Yalin (1977), Chang et al. (1967), Barekyan (1962), and Pedroli (1963). The Einstein bedload equation has not been treated separately since it agreed very well with the Yalin and the Meyer-Peter and Müller equations.

The sediment transport capacity was investigated assuming that sediment size, fluid properties and gravitational acceleration were constant. Particular attention was focused at the values of β and γ which are the exponents of the slope and water discharge in equation 19. For each of the four types of flow described previously, the transformed relationships are summarized in Table 4 as follows: (a) laminar sheet flow; (b) turbulent flow over smooth surface as given by the Blasius equation; (c) turbulent flow described by the Manning equation; and (d) turbulent flow with constant Darcy-Weisbach friction factor f or Che'zy coefficient.

The last column for each type of flow represents an index of fitness of these basic equations with the observed value of exponents. This index is equal to the number of parameters (β, γ) enclosed within the ranges of empirical coefficients as determined in the previous section ($1.2 < \beta < 1.9$ and $1.4 < \gamma < 2.4$). The higher the index, the better this equation should compare with observed data. Conversely, when the index is equal to zero, the given equation is expected to be a poor relationship to predict the sediment transport capacity of overland flow.

The results in this table show that the exponents β of most relationships are within the range of observed values while the exponents γ are usually too small to fall within the range of empirical coefficients. These results were anticipated since it was demonstrated in the analysis of flow characteristics summarized in Table 2 that the exponent of slope remains constant while the exponent of discharge varies for different flow conditions.

CONCLUSIONS

This study points at the relationship existing between the mechanics of overland flow and soil erosion by rainfall. The authors address the problem of estimating the sediment transport capacity for rainfall erosion based on the mechanics of overland flow. The results of this study are of particular interest to:

1. soil scientists concerned with the decrease of productivity of agricultural land caused by rainfall erosion;
2. watershed modelers looking for a better sediment transport capacity relationship for mathematical simulation of erosion processes;
3. sedimentologists interested in the mechanics of sediment transport for both laminar and turbulent flows.

A general sediment transport relationship supported by dimensional analysis ($q_s \sim s^{\beta} q^{\gamma} i^{\delta}\ [1 - \tau_c/\tau_o]^{\epsilon}$) is recommended and the major conclusions of the study are summarized as follows: the analysis of overland flow characteristics encompasses a wide variety of flow conditions varying from laminar sheet flows on uniform soil surfaces to turbulent flows in rills and gullies. When the principal hydraulic variables of flow depth, velocity, and bed shear stress are written in terms of slope and discharge, the exponent of slope remains constant for these various types of flow. For different types of flow the exponents of discharge for the velocity and shear stress were shown to vary in opposite directions. Therefore, for predicting soil erosion the applicability of sediment transport relationships derived for turbulent flows depends on whether the sediment transport capacity is a function of velocity or shear stress.

Most of the sediment transport equations used for turbulent flow in streams should not be applied to rainfall erosion in laminar sheet flows. Among the equations examined, only those proposed by Engelund-Hansen and Barekyan seem relevant for predicting soil erosion losses by overland runoff. The formulas suggested by Shields, Kalinske-Brown and Yalin might also be considered though the exponent of discharge is clearly too small in the case of laminar sheet flow. The other equations generally underestimate the parameters β and γ and are irrelevant to predict rainfall erosion.

The range of values of the exponents of slope β and discharge γ were well-defined in this analysis of empirical relationships. The transformation of several sediment transport equations for overland flow can be summarized as follows: the empirical exponent β varies between 1.2 and 1.9 while the exponent γ ranges from 1.4 to 2.4. The variation of these exponents indicates the complexity of soil erosion processes and the specificity of each relationship for the site-specific conditions under which they were derived. Moreover, these exponents are function of the formation of rills and this study shows that both exponents β and γ of the sediment transport capacity relationship increase when the rills develop.

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LIST OF SYMBOLS

A	coefficient for raindrop impact
a, b, c, d	coefficients
r, r_1, r_2	constants
C	Chezy coefficient
d_s	size of sediment
f	Darcy-Weisbach friction factor
g	gravitational acceleration
h	flow depth
i	rainfall intensity
k_o	surface friction coefficient
K	friction parameter for laminar sheet flow
L	slope length
n	Manning coefficient
q	unit water discharge
q_c	critical unit water discharge
q_s	unit sediment discharge
R^2	coefficient of determination
S	slope
S_f	slope of the energy line
u	velocity at a distance y from the water surface
$\bar{u}$	mean velocity
U_*	shear velocity
$\alpha,\beta,\gamma,\delta,\varepsilon$	coefficients of the sediment transport equation
δ'	thickness of the laminar sublayer
γ	dynamic viscosity
ν	kinematic viscosity
ρ	specific mass of water
ρ_s	specific mass of sediments
τ_o	bed shear stress
τ_c	critical bed shear stress

CHAPTER 8

8.2. Dewatering Calculations Deference Letter

M E M O R A N D U M

Date: January 29, 2018

To: Greg Mattson, AICP, Project Manager
Planning and Development Services, County of San Diego

From: Alisa Vialpando, P.E.

Subject: **Otay Ranch- Village 14 and Planning Areas 16/19: Water Quality Basin- dewatering calculations**

This memo has been prepared to address the County of San Diego plan review comment 6-49 regarding the *SWQMP for Otay Ranch Village 14 and Planning Areas 16/19* which had a submittal date of August 30, 2017. The comment is provided below for quick reference:

The drawdown calculations were not included as part of this submittal. Either include a drawdown calculation on the next submittal OR provide a certified letter from the EOW stating that in their professional opinion deferring this requirement to final engineering will not cause significant design changes on this project.

This letter is provided in response to the comment and is also applicable to the *SWQMP for Otay Ranch Village 14 and Planning Areas 16/19- Land Exchange Alternative* since both projects will utilize similar treatment control BMPs. In particular, both projects propose regional biofiltration basins for most of the developed areas. These basins will concurrently serve as flow control basins to address hydromodification. Due to the nature of these basins being low-flow basins which receive a maximum of the Q10 flowrate, deference of providing dewatering calculations at this phase of the project is acceptable. Although no significant design changes are anticipated, options such as re-allocation of drainage areas, optimization of outlet structures, or preparation of a vector control plans are all alternatives which could be explored to meet or address dewatering concerns and requirements.

Should you have any questions regarding the information contained within this memo, please contact me at (858) 558-4500.

Alisa S. Vialpando

Sincerely,
Alisa S. Vialpando, R.C.E. 47945
Vice President/Principal