CEQA DRAINAGE STUDY

For

LANTERN CREST RIDGE ADDITION

SANTEE, CA 92071

Prepared for**:**

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CHAPTER 1 - EXECUTIVE SUMMARY

1.1 – Introduction

The Lantern Crest Ridge Addition project is located at Lantern Crest Way in the City of Santee, County of San Diego, California.

Runoff from the site drains to two (2) locations. For drainage analysis, two (2) points of compliance (POC) have been designated downstream of the project site for hydrologic analysis purposes. Runoff from the site ultimately drains to the San Diego River located approximately 1.75 miles to the west of the project site.

This study analyzes existing and developed condition 100-year peak flowrates from the site to the POCs. Both POCs are curb inlets located along Graves Avenue to the east of the site.

The project site lies outside any FEMA 100-year floodplain zones. Therefore, no Letters of Map Revision will be required. The corresponding FEMA map is provided.

Treatment of storm water runoff from the site has been addressed in a separate report - the "Storm Water Quality Management Plan for Lantern Crest Ridge Addition", dated April 2019 by REC Consultants.

Per the County of San Diego drainage criteria, the Modified Rational Method should be used to determine peak design flowrates when the contributing drainage area is less than 1.0 square mile. Since the total watershed area discharging from the site is less than 1.0 square mile, the Advanced Engineering Software (AES) computer software was used to model the pre- and post-developed condition runoff response per the Modified Rational Method.

Methodology used for the computation of hydrographs is consistent with criteria set forth in the "County of San Diego Drainage Design Manual" dated June 2003. A more detailed explanation of methodology used for this analysis is provided in Chapter 2 of this report.

Developed condition peak flows were calculated using the AES computer program. The corresponding hydrographs were generated using the Rick Engineering's RatHydro software in accordance with the County of San Diego Hydrology Manual. Hydraulic Modified-Puls detention basin routing of the AES rational method hydrology was performed using the Army Corps of Engineers HEC-HMS software.

1.2 – Summary of Existing Conditions

In existing conditions, the Lantern Crest Ridge Addition project site is an undisturbed lot.

Runoff from the existing site drains to two (2) POCs, POC-1 and POC-2. Both POCs are existing inlets located west of the project along Graves Avenue. It is important to note that both of the POCs receive offsite runoff from the adjacent hillside and developments to the east of the project. The majority of the runoff received by POC-2 has previously been calculated in the "Hydrology/Hydraulic Study for Lantern Crest" dated April 21st, 2008 and prepared by CDS Civil Engineers. The Q_{100} flow rate determined in this report has been incorporated into the existing conditions hydrology calculations for this site.

Table 1 summarizes the existing condition design 100-year peak flows from the project site and surrounding area. The P_6 value for the 100-year event is 2.53-inches as seen in the isopluvial map provided in Chapter 2 Section 2.1 of this report. Per the County of San Diego criteria a runoff coefficient of 0.35 (Undisturbed Natural Terrain on Type D soils) was used for the tributary areas to the POC and coefficients of 0.66 and 0.71 (High Density Residential on Type A and Type D soils, respectively) were used for the developed areas surrounding the site. Refer to Chapter 2 Section 2.3 for the Runoff Coefficient Table as provided in the County of San Diego Hydrology Manual. The complete analysis of the existing drainage conditions has been provided in Chapter 3 of this report.

Table 1–SUMMARY OF EXISTING CONDITIONS FLOWS

Discharge Location	Drainage Area (AC)	100-Year Peak Flow (CFS)
POC-1	10.54	21.21
POC-2	59.83	75.65

1.3 – Summary of Developed Conditions

In developed conditions, the Lantern Crest Ridge Addition project proposes the development of three (3) buildings, private road, parking lot, and associated landscaping.

The majority of runoff from the developed site will be conveyed via a combination of overland flow, curb and gutter flow, storm drain and brow ditches, to POC-1. In developed conditions, POC-2 will only receive a small portion of runoff from the proposed driveway that cannot be captured by the proposed curb inlet

Offsite flows that drain to the site in existing conditions shall be conveyed through the site via a bypass storm drain system. These flows shall bypass the proposed biofiltration basins and shall outlet at the western edge of the site adjacent to existing brow ditches which ultimately flow to POC-1.

Table 2 summarizes the unmitigated developed condition design peak flows from the project site. In proposed conditions, the tributary area draining to POC-2 is decreased thus decreasing the overall peak flow. As the majority of the onsite, developed flows are being directed to POC-1 these flows need to be mitigated to below existing conditions. The P_6 value for the 100-year event is 2.53-inches as seen in the isopluvial map provided in Chapter 2 Section 2.1 of this report. Per County of San Diego criteria, runoff coefficients of 0.71 (High Density Residential on Type D soil) and 0.35 (Natural Landscape on Type D soils) were used. Refer to Chapter 2 Section 2.3 for the Runoff Coefficient Table as provided in the County of San Diego Hydrology Manual. The complete analysis of the proposed unmitigated drainage conditions has been provided in Chapter 4 of this report.

Table 2–SUMMARY OF DEVELOPED CONDITIONS FLOWS – UNMITIGATED

Discharge Location	Drainage Area (AC)	100-Year Peak Flow (CFS)
POC-1	11.05	24.83
POC-2	59.32	75.54

Prior to discharging from the site, first flush runoff will be treated via three (3) biofiltration basin BMPs or a tree well in accordance with standards set forth by the Regional Water Quality Control Board and the City of Santee BMP Design Manual (see "Storm Water Quality Management Plan for Lantern Crest Ridge Addition" dated April 2019 and prepared by REC Consultants, Inc.). Should there be a blockage in the receiving stormdrain and/or outlet structure, the emergency outlet is the lowest curb inlet which then conveys flows to Graves Avenue as in existing conditions.

There is a collector pipe that runs beneath all three biofiltration basins and conveys the detained outflows from each basin to the downstream proposed drainage system. Thus each biofiltration basin has been analyzed individually with their respective tributary areas, inflows, etc.

The biofiltration basins are located within the project site and are responsible for addressing peak flow requirements for the project. In developed conditions, the basins will have a 21-inch gravel layer; an 18-inch amended soils layer, a surface ponding depth, and a riser spillway structure (see dimensions in Tables 3 and 4). The riser structure will act as a spillway such that peak flows can be safely discharged to the receiving storm drain system.

Note that the capacity of the tree well to mitigate peak flows is not considered in this study.

Table 3–SUMMARY OF BMP BASIN DIMENSIONS

BMP	DIMENSIONS					
	BMP Area[(1)] (ft^2)	Low Flow Orifice Diameter (in)	Gravel Depth[(5)] (in)	Depth Riser Invert (ft.)[(2)]	Weir Perimeter Length [(3)] (ft.)	Total Surface Depth [(4)] (ft.)
1-1	940	6	21	3.00	6.28	3.75
1-2	845	6	21	2.25	6.28	3.00
1-3	580	6	21	2.25	6.28	3.00

Notes (1): Area of amended soil = area of gravel = area of the BMP
(2): Depth of ponding beneath riser structure's first surface spillway to top of mulch layer (mulch = 3 inches)
(3): Overflow length is the circumference of a 2ft diameter standpipe
(4): Total surface depth of BMP is from top crest elevation to bottom of mulch layer
(5): Gravel depth includes 3 inches of dead storage below the LID orifice and 6 inches of filter layers.

Table 4–SUMMARY OF OUTLET DETAILS

BMP	Low Orifice			Top Riser		Retention Volume (CF)[(3)]
	Number	Diameter (in)	Elev[(1)] (ft.)	Length[(2)] (ft.)	Elev[(1)] (ft.)	
1-1	3	0.50	0.75	6.28	3.00	141
1-2	1	0.25	0.75	6.28	2.25	127
1-3	3	0.25	0.75	6.28	2.25	81

Notes: (1): Elevation 0.00 ft. is at the bottom of mulch layer.

(2): Overflow length is the circumference of a 2ft diameter standpipe

(3):Retention Volume calculated as Volume of amended soils * (field capacity-wilting point)=Volume of amended soils*(0.2-0.1)=0.1*Volume of amended soils

The developed condition peak flows were calculated using the Modified Rational Method. The corresponding hydrographs were generated using the RickRat Hydro program by Rick Engineering. The hydrographs were then routed in HEC-HMS, per the Modified Puls Method, through the proposed on-site underground detention facility. The results are summarized in Tables 5.

Table 5–SUMMARY OF DETENTION BASIN ROUTING

Detention Basin	100-Year Peak Inflow (cfs)	100-Year Peak Outflow (cfs)	Peak Water Surface Elevation (ft.)
BMP-1-1	3.17	0.13	3.24[(1)]
BMP-1-2	0.57	0.07	0.75[(1)]
BMP-1-3	1.46	0.07	2.48[(1)]

Notes: (1): Elevation is from bottom of mulch layer. Note that routing begins at the invert of the first surface outlet, see Table 4 for basin outlet locations.

As HEC-HMS uses an elevation-storage-discharge function to model the basin volume (stage-storage) and basin discharge (stage-discharge) relationships, the available storage volume was calculated from the first surface slot to the crest of the basins.

The Rational Method hydrographs, stage-storage, stage-discharge relationships and HEC-HMS model output are provided in Chapter 6 of this report.

1.4 – Summary of Results

Table 6 summarizes the developed and existing conditions drainage areas and resultant peak flow rates at the POCs from the Lantern Crest Ridge Addition project. The complete analysis of the proposed mitigated drainage conditions has been provided in Chapter 5 of this report.

Table 6–SUMMARY OF AREAS AND 100YR PEAK FLOWS

Discharge Location	Area (ac)			100 Year Peak Flow (cfs)		
	Existing	Developed	Difference	Existing	Developed	Difference
POC-1	10.54	11.05	+0.51	21.21	21.21*	0
POC-2	59.83	59.32	-0.51	75.65	75.54	-0.11

*Flows are mitigated

As shown in the above table, the proposed Lantern Crest Ridge Addition project site will not increase the peak flows discharging to POC-1 and will result in a net decrease of peak flow discharging to POC-2.

All developed runoff will receive water quality treatment in accordance with the site specific SWQMP. Final design details will be provided at the final engineering phase of the development.

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1.5 – Conclusions

This report has been prepared in accordance with the County of San Diego Hydrology Manual. This report has evaluated and addressed the potential impacts and proposed mitigation measures. A summary of the facts and findings associated with this project and the measures addressed by this report are as follows:

- The project will not alter drainage patterns on the site or increase runoff after development.
- The ultimate discharge points will not be changed.
- Graded areas and slopes will be hydro-seeded to reduce or eliminate sediment discharge.
- The project will respond to the CEQA questions that follow.

CEQA: Identify and discuss, with appropriate backup/research information, the following questions item by item for CEQA purposes. Would the project:

A. Substantially alter the existing drainage patterns of the site or area, including through the alteration if the course of a stream or river, in a manner which would result in substantial erosion or siltation on – or off-site?

The project does not substantially alter the existing drainage pattern of the area and does not alter the course of a stream or river. The storm drain system for the entire project is designed to route and convey all resulting runoff from developed conditions to existing points of discharge.

B. Substantially alter the existing drainage patterns of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?

The project will not substantially alter the existing drainage pattern of the area as it will not alter the course of a stream or river, and also will not substantially increase the rate or amount of surface runoff in a manner which would result in on- or off-site flooding.

C. Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems?

The project will not create runoff water which would exceed the capacity of the existing storm water system. All project discharge points release water at rates less than or equal to planned existing conditions.

D. Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood insurance Rate Map or other flood hazard delineation map, including County Floodplain Maps? For example; research the foregoing and provide same (to indicate applicability or not) in the study?

The project does not place any housing within a 100-year flood hazard area.

E. Place within a 100-year flood hazard area structures which would impede or redirect flood flows?

There are no structures proposed within a 100-year flood hazard area.

F. Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam on-sit or off-site?

N/A

1.6 – References

"*County of San Diego Hydrology Manual*", June 2003

"Hydrology/Hydraulics Study for Lantern Crest" dated August 30, 2007, revised April 21, 2008 by REC Consultants.

"*Stormwater Quality Management Plan for Lantern Crest Ridge Addition*", dated April 2019 by REC Consultants.

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1.7 – Declaration of Responsible Charge

THIS DRAINAGE STUDY HAS BEEN PREPARED UNDER THE DIRECTION OF THE FOLLOWING REGISTERED CIVIL ENGINEER. THE REGISTERED ENGINEER ATTESTS TO THE TECHNICAL INFORMATION CONTAINED HEREIN AND THE ENGINEERING DATA UPON WHICH RECOMMENDATIONS, CONCLUSIONS, AND DECISIONS ARE BASED.

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CHAPTER 2 - METHODOLOGY

2.1 – County of San Diego Design Criteria

The following are excerpts from the San Diego County Hydrology Manual. As the project site is less than 1 square mile the Rational Method, as described below, was used to determine the peak flows for pre- and post-developed conditions.

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SECTION 3
RATIONAL METHOD AND MODIFIED RATIONAL METHOD

3.1 THE RATIONAL METHOD

The Rational Method (RM) is a mathematical formula used to determine the maximum runoff rate from a given rainfall. It has particular application in urban storm drainage, where it is used to estimate peak runoff rates from small urban and rural watersheds for the design of storm drains and small drainage structures. The RM is recommended for analyzing the runoff response from drainage areas up to approximately 1 square mile in size. It should not be used in instances where there is a junction of independent drainage systems or for drainage areas greater than approximately 1 square mile in size. In these instances, the Modified Rational Method (MRM) should be used for junctions of independent drainage systems in watersheds up to approximately 1 square mile in size (see Section 3.4); or the NRCS Hydrologic Method should be used for watersheds greater than approximately 1 square mile in size (see Section 4).

The RM can be applied using any design storm frequency (e.g., 100-year, 50-year, 10-year, etc.). The local agency determines the design storm frequency that must be used based on the type of project and specific local requirements. A discussion of design storm frequency is provided in Section 2.3 of this manual. A procedure has been developed that converts the 6-hour and 24-hour precipitation isopluvial map data to an Intensity-Duration curve that can be used for the rainfall intensity in the RM formula as shown in Figure 3-1. The RM is applicable to a 6-hour storm duration because the procedure uses Intensity-Duration Design Charts that are based on a 6-hour storm duration.

3.1.1 Rational Method Formula

The RM formula estimates the peak rate of runoff at any location in a watershed as a function of the drainage area (A), runoff coefficient (C), and rainfall intensity (I) for a duration equal to the time of concentration (T_c), which is the time required for water to

flow from the most remote point of the basin to the location being analyzed. The RM formula is expressed as follows:

$$Q = C\,I\,A$$

Where: Q = peak discharge, in cubic feet per second (cfs)
C = runoff coefficient, proportion of the rainfall that runs off the surface (no units)
I = average rainfall intensity for a duration equal to the T_c for the area, in inches per hour (Note: If the computed T_c is less than 5 minutes, use 5 minutes for computing the peak discharge, Q)
A = drainage area contributing to the design location, in acres

Combining the units for the expression CIA yields:

$$\left(\frac{1\,\text{acre}\times\text{inch}}{\text{hour}}\right)\left(\frac{43{,}560\,\text{ft}^2}{\text{acre}}\right)\left(\frac{1\,\text{foot}}{12\,\text{inches}}\right)\left(\frac{1\,\text{hour}}{3{,}600\,\text{seconds}}\right) \Rightarrow 1.008\,\text{cfs}$$

For practical purposes the unit conversion coefficient difference of 0.8% can be ignored.

The RM formula is based on the assumption that for constant rainfall intensity, the peak discharge rate at a point will occur when the raindrop that falls at the most upstream point in the tributary drainage basin arrives at the point of interest.

Unlike the MRM (discussed in Section 3.4) or the NRCS hydrologic method (discussed in Section 4), the RM does not create hydrographs and therefore does not add separate subarea hydrographs at collection points. Instead, the RM develops peak discharges in the main line by increasing the T_c as flow travels downstream.

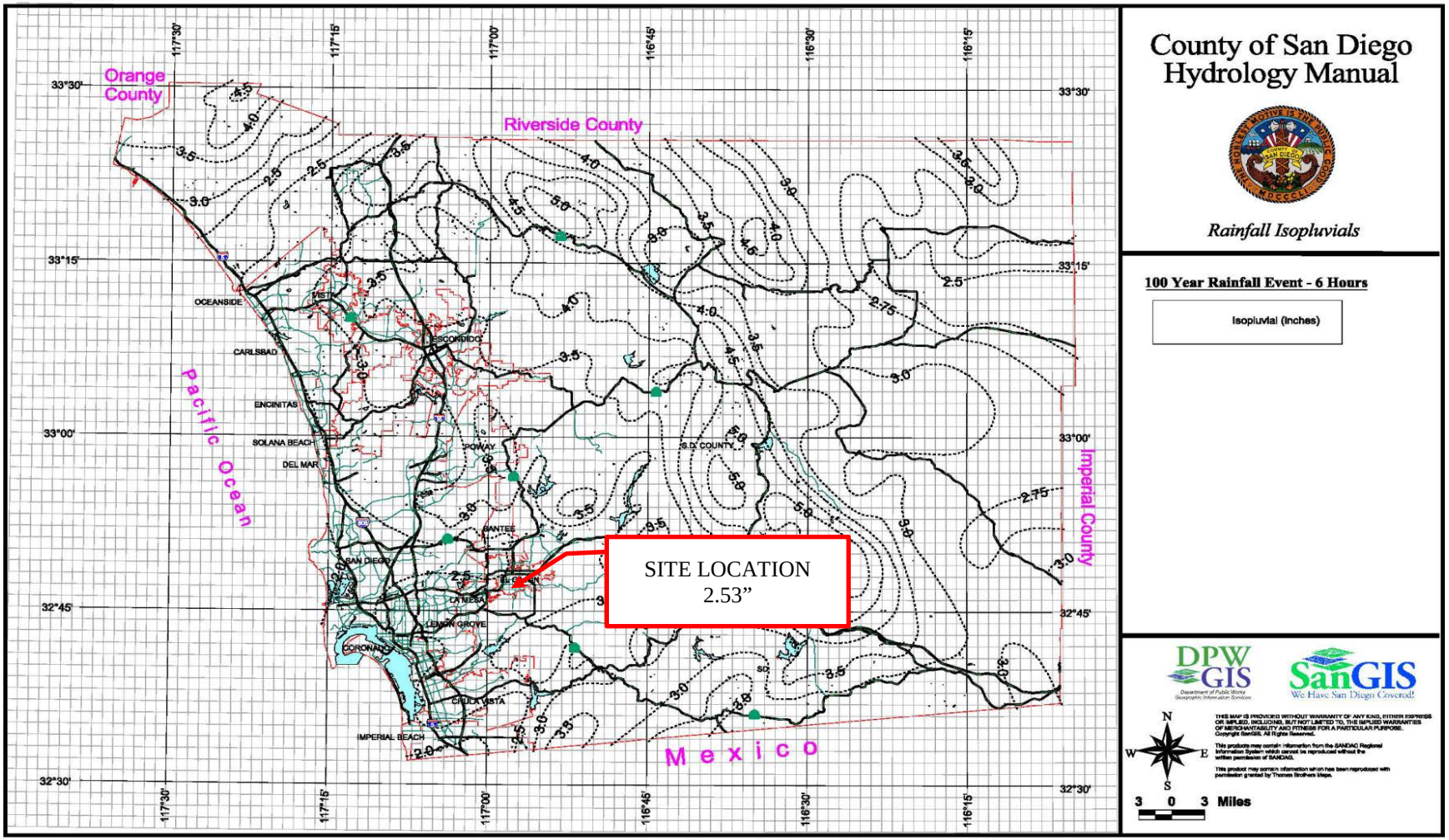
Characteristics of, or assumptions inherent to, the RM are listed below:

- The discharge flow rate resulting from any I is maximum when the I lasts as long as or longer than the T_c.

2.2 – Design Rainfall Determination

Peak flows were calculated for the 100-year storm per the County of San Diego Hydrology Manual. The following maps provide the 6-hr and 24-hr 100-year rainfall isopluvial data. A P6 and P24 value of 2.53 and 4.47 inches, respectively, were assumed for this analysis.

2.2.1 – 100-Year, 6-Hour Rainfall Isopluvial Map



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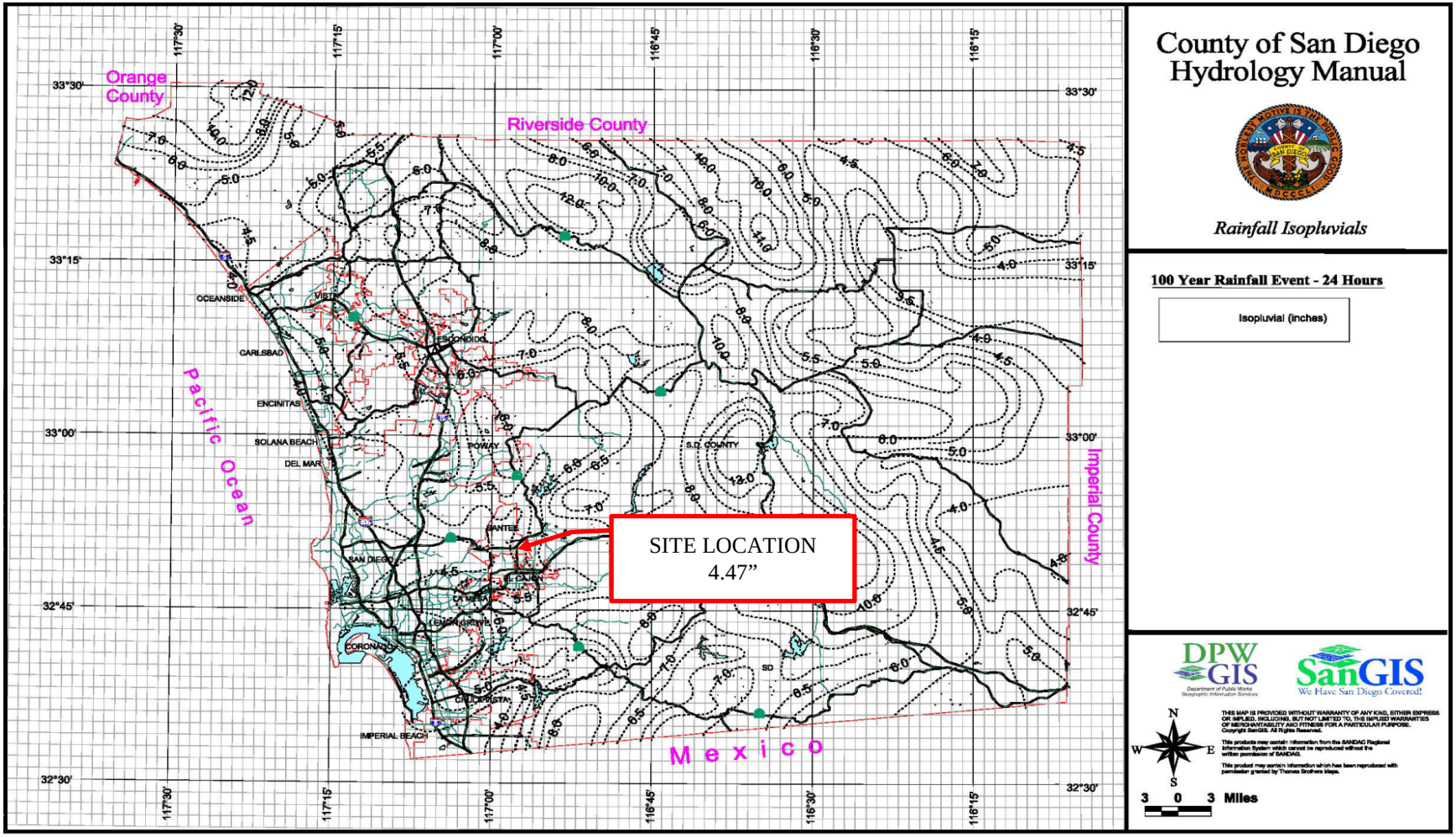
2.2.2 – 100-Year, 24-Hour Rainfall Isopluvial Map



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2.3 – Runoff Coefficient Determination

The results of the Web Soil Survey, which can be found as part of Chapter 8, show that the site sits entirely on Type D soil. Per County of San Diego criteria, a runoff coefficient "C" value of 0.35 was assumed for the existing Undisturbed Natural Terrain. In developed conditions, runoff coefficients of 0.71 and 0.35 were assumed for High Density Residential and Permanent Open Space (identified as self-mitigating areas in this report), respectively.

- The storm frequency of peak discharges is the same as that of I for the given T_c.
- The fraction of rainfall that becomes runoff (or the runoff coefficient, C) is independent of I or precipitation zone number (PZN) condition (PZN Condition is discussed in Section 4.1.2.4).
- The peak rate of runoff is the only information produced by using the RM.

3.1.2 Runoff Coefficient

Table 3-1 lists the estimated runoff coefficients for urban areas. The concepts related to the runoff coefficient were evaluated in a report entitled *Evaluation, Rational Method "C" Values* (Hill, 2002) that was reviewed by the Hydrology Manual Committee. The Report is available at San Diego County Department of Public Works, Flood Control Section and on the San Diego County Department of Public Works web page.

The runoff coefficients are based on land use and soil type. Soil type can be determined from the soil type map provided in Appendix A. An appropriate runoff coefficient (C) for each type of land use in the subarea should be selected from this table and multiplied by the percentage of the total area (A) included in that class. The sum of the products for all land uses is the weighted runoff coefficient (Σ[CA]). Good engineering judgment should be used when applying the values presented in Table 3-1, as adjustments to these values may be appropriate based on site-specific characteristics. In any event, the impervious percentage (% Impervious) as given in the table, for any area, shall govern the selected value for C. The runoff coefficient can also be calculated for an area based on soil type and impervious percentage using the following formula:

$$C = 0.90 \times (\% \text{ Impervious}) + C_p \times (1 - \% \text{ Impervious})$$

Where: C_p = Pervious Coefficient Runoff Value for the soil type (shown in Table 3-1 as Undisturbed Natural Terrain/Permanent Open Space, 0% Impervious). Soil type can be determined from the soil type map provided in Appendix A.

The values in Table 3-1 are typical for most urban areas. However, if the basin contains rural or agricultural land use, parks, golf courses, or other types of nonurban land use that are expected to be permanent, the appropriate value should be selected based upon the soil and cover and approved by the local agency.

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

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2.4 – Urban Watershed Overland Time of Flow Nomograph

The time of concentration (T_c) for each drainage area was calculated per the methodology outlined below. T_c calculations were performed using Table 3-2 by AES and can be found in Chapters 3-5 of this report.

3.1.4 Time of Concentration

The Time of Concentration (T_c) is the time required for runoff to flow from the most remote part of the drainage area to the point of interest. The T_c is composed of two components: initial time of concentration (T_i) and travel time (T_t). Methods of computation for T_i and T_t are discussed below. The T_i is the time required for runoff to travel across the surface of the most remote subarea in the study, or "initial subarea." Guidelines for designating the initial subarea are provided within the discussion of computation of T_i. The T_t is the time required for the runoff to flow in a watercourse (e.g., swale, channel, gutter, pipe) or series of watercourses from the initial subarea to the point of interest. For the RM, the T_c at any point within the drainage area is given by:

$$T_c = T_i + T_t$$

Methods of calculation differ for natural watersheds (nonurbanized) and for urban drainage systems. When analyzing storm drain systems, the designer must consider the possibility that an existing natural watershed may become urbanized during the useful life of the storm drain system. Future land uses must be used for T_c and runoff calculations, and can be determined from the local Community General Plan.

3.1.4.1 Initial Time of Concentration

The initial time of concentration is typically based on sheet flow at the upstream end of a drainage basin. The Overland Time of Flow (Figure 3-3) is approximated by an equation developed by the Federal Aviation Agency (FAA) for analyzing flow on runaways (FAA, 1970). The usual runway configuration consists of a crown, like most freeways, with sloping pavement that directs flow to either side of the runway. This type of flow is uniform in the direction perpendicular to the velocity and is very shallow. Since these depths are ¼ of an inch (more or less) in magnitude, the relative roughness is high. Some higher relative roughness values for overland flow are presented in Table 3.5 of the *HEC-1 Flood Hydrograph Package User's Manual* (USACE, 1990).

The sheet flow that is predicted by the FAA equation is limited to conditions that are similar to runway topography. Some considerations that limit the extent to which the FAA equation applies are identified below:

- Urban Areas – This "runway type" runoff includes:
  1) Flat roofs, sloping at 1% ±
  2) Parking lots at the extreme upstream drainage basin boundary (at the "ridge" of a catchment area).
     Even a parking lot is limited in the amounts of sheet flow. Parked or moving vehicles would "break-up" the sheet flow, concentrating runoff into streams that are not characteristic of sheet flow.
  3) Driveways are constructed at the upstream end of catchment areas in some developments. However, if flow from a roof is directed to a driveway through a downspout or other conveyance mechanism, flow would be concentrated.
  4) Flat slopes are prone to meandering flow that tends to be disrupted by minor irregularities and obstructions. Maximum Overland Flow lengths are shorter for the flatter slopes (see Table 3-2).

- Rural or Natural Areas - The FAA equation is applicable to these conditions since (.5% to 10%) slopes that are uniform in width of flow have slow velocities consistent with the equation. Irregularities in terrain limit the length of application.
  1) Most hills and ridge lines have a relatively flat area near the drainage divide. However, with flat slopes of .5% ±, minor irregularities would cause flow to concentrate into streams.
  2) Parks, lawns and other vegetated areas would have slow velocities that are consistent with the FAA Equation.

The concepts related to the initial time of concentration were evaluated in a report entitled *Initial Time of Concentration, Analysis of Parameters* (Hill, 2002) that was reviewed by the Hydrology Manual Committee. The Report is available at San Diego County Department of Public Works, Flood Control Section and on the San Diego County Department of Public Works web page.

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.

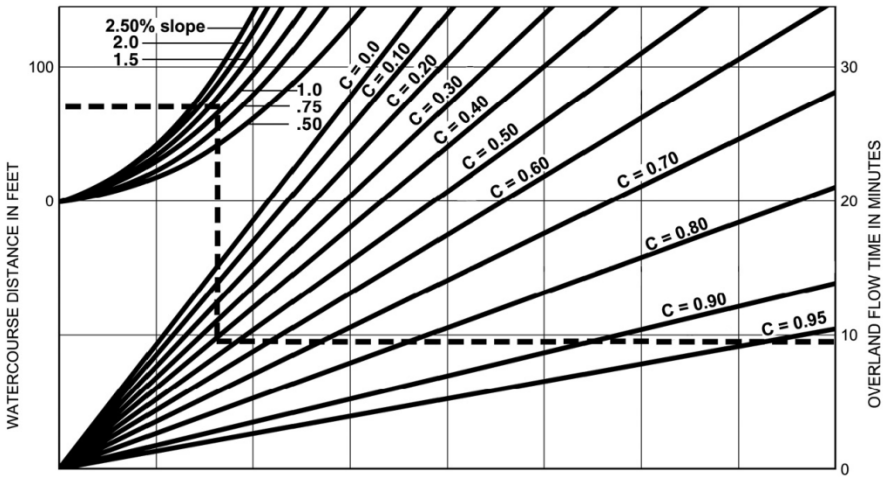
Table 3-2 provides limits of the length (Maximum Length (L_M)) of sheet flow to be used in hydrology studies. Initial T_i values based on average C values for the Land Use Element are also included. These values can be used in planning and design applications as described below. Exceptions may be approved 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: Airport Drainage, Federal Aviation Administration, 1965

Rational Formula - Overland Time of Flow Nomograph

FIGURE 3-3

In order to calculate time of concentration a roughness value, n, from Manning's formula must be assigned based on the characteristics of the channel. The following table is from the San Diego County Drainage Design Manual and provides n values for various surface types. Note, since the site is a mixture of short and high grass an average n value of 0.035 was assumed.

Table A-1

Table A-1 Average Manning Roughness Coefficients for Pavement and Gutters[1]

Concrete Gutter[2]	0.015
Concrete Pavement	
Float Finish	0.014
Broom Finish	0.016
Concrete Gutter with Asphalt Pavement	
Smooth Finish	0.013
Rough Texture	0.015
Asphalt Pavement	
Smooth Finish	0.013
Rough Texture	0.016

Based on FHWA HEC-22.

[1] Based on materials and workmanship required by standard specifications.
[2] Increase roughness coefficient in gutters with mild slopes where sediment might accumulate by 0.020.

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Table A-2

Table A-2 Average Manning Roughness Coefficients for Closed Conduits[3]

Reinforced Concrete Pipe (RCP)	0.013
Corrugated Metal Pipe and Pipe Arch	
2-3/8 x 1/2 inch Corrugations	
Unlined	0.024
Half Lined	
Full Flow	0.018
d/D>=0.60	0.016
d/D<0.60	0.013
Fully Lined	0.013
3 x 1 inch Corrugations	0.027
6 x 2 inch Corrugations	0.032
Spiral Rib Pipe	0.013
Helically Wound Pipe	
18-inch	0.015
24-inch	0.017
30-inch	0.019
36-inch	0.021
42-inch	0.022
48-inch	0.023
Plastic Pipe (HPDE and PVC)	
Smooth	0.013
Corrugated	0.024
Vitrified Clay Pipe	0.014
Cast-Iron Pipe (Uncoated)	0.013
Steel Pipe	0.011
Brick	0.017
Cast-In-Place Concrete Pipe	
Rough Wood Forms	0.017
Smooth Wood or Steel Forms	0.014

[3] Based on materials and workmanship required by standard specifications.

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Table A-3

Table A-3 Average Manning Roughness Coefficients for Small Open Channels Conveying Less than 50 cfs[4]

	Design Flow Depth		
Lining Type	**0 – 0.5 ft**	**0.5 – 2.0 ft**	**> 2.0 ft**
Concrete (Poured)	0.015	0.013	0.013
Air Blown Concrete	0.023	0.019	0.016
Grouted Riprap	0.040	0.030	0.028
Stone Masonry	0.042	0.032	0.030
Soil Cement	0.025	0.022	0.020
Bare Soil	0.023	0.020	0.020
Rock Cut	0.045	0.035	0.025
Rock Riprap	Based on Rock Size (See Section 5.7.2)		

Table A-4

Table A-4 Average Manning Roughness Coefficients for Larger Open Channels

Unlined Channels	
Clay Loam	0.023
Sand	0.020
Lined Channels	
Grass Lined (Well-Maintained)	0.035
Grass Lined (Not Maintained)	0.045
Wetland-Bottom Channels (New Channel)	0.023
Wetland-Bottom Channels (Mature Channel)	See Table A-5
Riprap-Lined Channels	See Section 5.7.2
Concrete (Poured)	0.014
Air Blown Mortar (Gunite or Shotcrete)[5]	0.016
Asphaltic Concrete or Bituminous Plant Mix	0.018

For channels with revetments or multiple lining types, use composite Manning roughness coefficient based on component lining materials.

[4] Based on materials and workmanship required by standard specifications.
[5] For air-blown concrete, use n=0.012 (if troweled) and n=0.025 if purposely roughened.

Table A-5

Table A-5 Average Manning Roughness Coefficients for Natural Channels

Minor Streams (Surface Width at Flood Stage < 100 ft)	
Fairly Regular Section	
(A) Some Grass and Weeds, Little or No Brush	0.030
(B) Dense Growth of Weeds, Depth of Flow Materially Greater Than Weed Height	0.040
(C) Some Weeds, Light Brush on Banks	0.040
(D) Some Weeds, Heavy Brush on Banks	0.060
(E) For Trees within Channel with Branches Submerged at High Stage, Increase All Above Values By	0.015
Irregular Section, with Pools, Slight Channel Meander	
Channels (A) to (E) Above, Increase All Values By	0.015
Mountain Streams; No Vegetation in Channel, Banks Usually Steep, Trees and Brush along Banks Submerged at High Stage	
(A) Bottom, Gravel, Cobbles and Few Boulders	0.050
(B) Bottom, Cobbles with Large Boulders	0.060
Flood Plains (Adjacent To Natural Streams)	
Pasture, No Brush	
(A) Short Grass	0.030
(B) High Grass	0.040
Cultivated Areas	
(A) No Crop	0.040
(B) Mature Row Crops	0.040
(C) Mature Field Crops	0.050
Heavy Weeds, Scattered Brush	0.050
Light Brush and Trees	0.060
Medium To Dense Brush	0.090
Dense Willows	0.170
Cleared Land with Tree Stumps, 100-150 Per Acre	0.060
Heavy Stand of Timber, Little Undergrowth	
(A) Flood Depth below Branches	0.110
(B) Flood Depth Reaches Branches	0.140

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2.5 – County of San Diego Intensity- Duration Curve

The rainfall intensity (I) for each drainage area was determined using the 100-year P6 value and the time of concentration. The intensity was calculated in AES and was used to determine the peak flow for each drainage area.

3.1.3 Rainfall Intensity

The rainfall intensity (I) is the rainfall in inches per hour (in/hr) for a duration equal to the T_c for a selected storm frequency. Once a particular storm frequency has been selected for design and a T_c calculated for the drainage area, the rainfall intensity can be determined from the Intensity-Duration Design Chart (Figure 3-1). The 6-hour storm rainfall amount (P_6) and the 24-hour storm rainfall amount (P_{24}) for the selected storm frequency are also needed for calculation of I. P_6 and P_{24} can be read from the isopluvial maps provided in Appendix B. An Intensity-Duration Design Chart applicable to all areas within San Diego County is provided as Figure 3-1. Figure 3-2 provides an example of use of the Intensity-Duration Design Chart. Intensity can also be calculated using the following equation:

$$I = 7.44\ P_6\ D^{-0.645}$$

Where: P_6 = adjusted 6-hour storm rainfall amount (see discussion below)
D = duration in minutes (use T_c)

Note: This equation applies only to the 6-hour storm rainfall amount (i.e., P_6 cannot be changed to P_{24} to calculate a 24-hour intensity using this equation).

The Intensity-Duration Design Chart and the equation are for the 6-hour storm rainfall amount. In general, P_6 for the selected frequency should be between 45% and 65% of P_{24} for the selected frequency. If P_6 is not within 45% to 65% of P_{24}, P_6 should be increased or decreased as necessary to meet this criteria. The isopluvial lines are based on precipitation gauge data. At the time that the isopluvial lines were created, the majority of precipitation gauges in San Diego County were read daily, and these readings yielded 24-hour precipitation data. Some 6-hour data were available from the few recording gauges distributed throughout the County at that time; however, some 6-hour data were extrapolated. Therefore, the 24-hour precipitation data for San Diego County are considered to be more reliable.

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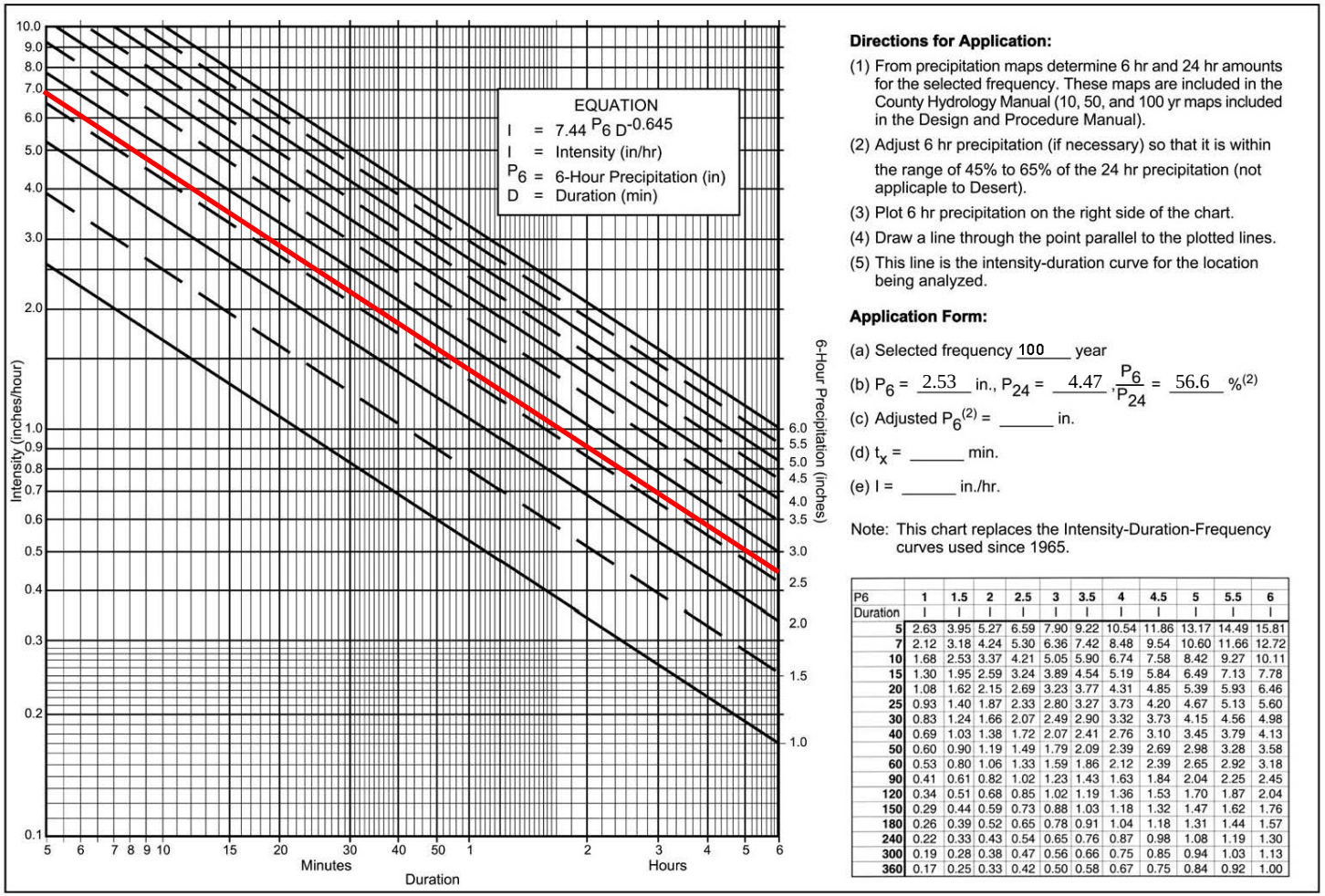

Directions for Application:

(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 applicable 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 = 2.53 in., P_{24} = 4.47, $\frac{P_6}{P_{24}}$ = 56.6 %(2)

(c) Adjusted $P_6^{(2)}$ = _____ 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	I	I	I	I	I	I	I	I	I	I	I
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

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2.6 – Model Development Summary (from County of San Diego Hydrology Manual)

The following excerpt from the County of San Diego Hydrology Manual is an overview for developing the drainage areas to be analyzed and calculating the peak flows. Each drainage area in pre- and post-developed conditions was delineated and analyzed following the protocol outlined below. A map of the pre-developed and post-developed drainage areas may be found in Chapter 7 of this report.

3.2 Developing Input Data for the Rational Method

This section describes the development of the necessary data to perform RM calculations. Section 3.3 describes the RM calculation process. Input data for calculating peak flows and T_c's with the RM should be developed as follows:

1. On a topographic base map, outline the overall drainage area boundary, showing adjacent drains, existing and proposed drains, and overland flow paths.

2. Verify the accuracy of the drainage map in the field.

3. Divide the drainage area into subareas by locating significant points of interest. These divisions should be based on topography, soil type, and land use. Ensure that an appropriate first subarea is delineated. For natural areas, the first subarea flow path length should be less than or equal to 4,000 feet plus the overland flow length (Table 3-2). For developed areas, the initial subarea flow path length should be consistent with Table 3-2. The topography and slope within the initial subarea should be generally uniform.

4. Working from upstream to downstream, assign a number representing each subarea in the drainage system to each point of interest. Figure 3-8 provides guidelines for node numbers for geographic information system (GIS)-based studies.

5. Measure each subarea in the drainage area to determine its size in acres (A).

6. Determine the length and effective slope of the flow path in each subarea.

7. Identify the soil type for each subarea.

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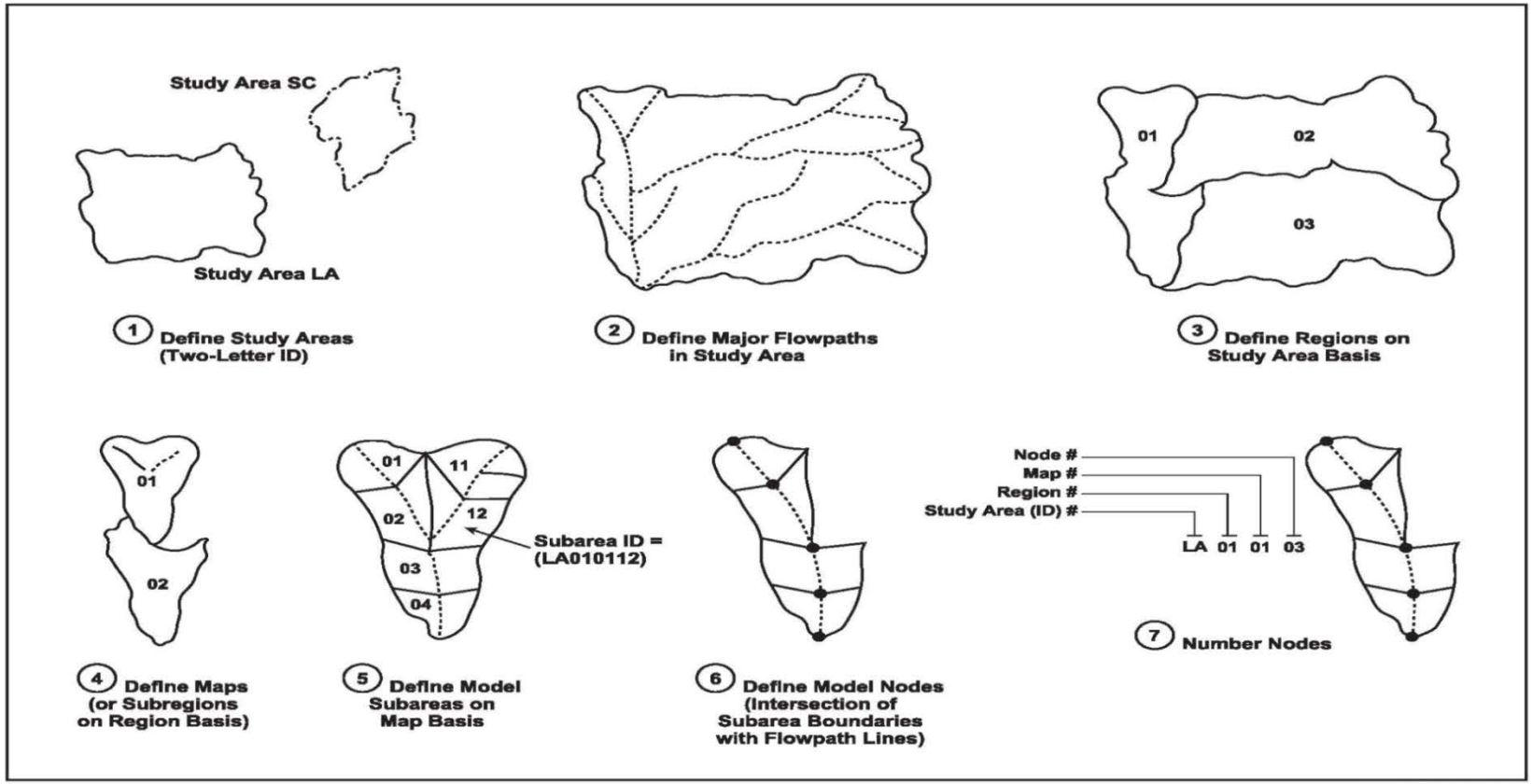

GIS/Hydrologic Model
Data Base Linkage Setup:
Nodes, Subareas, Links

FIGURE
3-8

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8. Determine the runoff coefficient (C) for each subarea based on Table 3-1. If the subarea contains more than one type of development classification, use a proportionate average for C. In determining C for the subarea, use future land use taken from the applicable community plan, Multiple Species Conservation Plan, National Forest land use plan, etc.

9. Calculate the CA value for the subarea.

10. Calculate the Σ(CA) value(s) for the subareas upstream of the point(s) of interest.

11. Determine P_6 and P_{24} for the study using the isopluvial maps provided in Appendix B. If necessary, adjust the value for P_6 to be within 45% to 65% of the value for P_{24}.

See Section 3.3 for a description of the RM calculation process.

3.3 Performing Rational Method Calculations

This section describes the RM calculation process. Using the input data, calculation of peak flows and T_c's should be performed as follows:

1. Determine T_i for the first subarea. Use Table 3-2 or Figure 3-3 as discussed in Section 3.1.4. If the watershed is natural, the travel time to the downstream end of the first subarea can be added to T_i to obtain the T_c. Refer to paragraph 3.1.4.2 (a).

2. Determine I for the subarea using Figure 3-1. If T_i was less than 5 minutes, use the 5 minute time to determine intensity for calculating the flow.

3. Calculate the peak discharge flow rate for the subarea, where $Q_p = \Sigma(CA)\, I$.
In case that the downstream flow rate is less than the upstream flow rate, due to the long travel time that is not offset by the additional subarea runoff, use the upstream peak flow for design purposes until downstream flows increase again.

4. Estimate the T_t to the next point of interest.

5. Add the T_t to the previous T_c to obtain a new T_c.

6. Continue with step 2, above, until the final point of interest is reached.

Note: The MRM should be used to calculate the peak discharge when there is a junction from independent subareas into the drainage system.

3.4 Modified Rational Method (for Junction Analysis)

The purpose of this section is to describe the steps necessary to develop a hydrology report for a small watershed using the MRM. It is necessary to use the MRM if the watershed contains junctions of independent drainage systems. The process is based on the design manuals of the City/County of San Diego. The general process description for using this method, including an example of the application of this method, is described below.

The engineer should only use the MRM for drainage areas up to approximately 1 square mile in size. If the watershed will significantly exceed 1 square mile then the NRCS method described in Section 4 should be used. The engineer may choose to use either the RM or the MRM for calculations for up to an approximately 1-square-mile area and then transition the study to the NRCS method for additional downstream areas that exceed approximately 1 square mile. The transition process is described in Section 4.

3.4.1 Modified Rational Method General Process Description

The general process for the MRM differs from the RM only when a junction of independent drainage systems is reached. The peak Q, T_c, and I for each of the independent drainage systems at the point of the junction are calculated by the RM. The independent drainage systems are then combined using the MRM procedure described below. The peak Q, T_c, and I for each of the independent drainage systems at the point of the junction must be calculated prior to using the MRM procedure to combine the independent drainage systems, as these

values will be used for the MRM calculations. After the independent drainage systems have been combined, RM calculations are continued to the next point of interest.

3.4.2 Procedure for Combining Independent Drainage Systems at a Junction

Calculate the peak Q, T_c, and I for each of the independent drainage systems at the point of the junction. These values will be used for the MRM calculations.

At the junction of two or more independent drainage systems, the respective peak flows are combined to obtain the maximum flow out of the junction at T_c. Based on the approximation that total runoff increases directly in proportion to time, a general equation may be written to determine the maximum Q and its corresponding T_c using the peak Q, T_c, and I for each of the independent drainage systems at the point immediately before the junction. The general equation requires that contributing Q's be numbered in order of increasing T_c.

Let Q_1, T_1, and I_1 correspond to the tributary area with the shortest T_c. Likewise, let Q_2, T_2, and I_2 correspond to the tributary area with the next longer T_c; Q_3, T_3, and I_3 correspond to the tributary area with the next longer T_c; and so on. When only two independent drainage systems are combined, leave Q_3, T_3, and I_3 out of the equation. Combine the independent drainage systems using the junction equation below:

Junction Equation: $T_1 < T_2 < T_3$

$$Q_{T1} = Q_1 + \frac{T_1}{T_2} Q_2 + \frac{T_1}{T_3} Q_3$$

$$Q_{T2} = Q_2 + \frac{I_2}{I_1} Q_1 + \frac{T_2}{T_3} Q_3$$

$$Q_{T3} = Q_3 + \frac{I_3}{I_1} Q_1 + \frac{I_3}{I_2} Q_2$$

Calculate Q_{T1}, Q_{T2}, and Q_{T3}. Select the largest Q and use the T_c associated with that Q for further calculations (see the three Notes for options). If the largest calculated Q's are equal (e.g., $Q_{T1} = Q_{T2} > Q_{T3}$), use the shorter of the T_c's associated with that Q.

This equation may be expanded for a junction of more than three independent drainage systems using the same concept. The concept is that when Q from a selected subarea (e.g., Q_2) is combined with Q from another subarea with a shorter T_c (e.g., Q_1), the Q from the subarea with the shorter T_c is reduced by the ratio of the I's (I_2/I_1); and when Q from a selected subarea (e.g., Q_2) is combined with Q from another subarea with a longer T_c (e.g., Q_3), the Q from the subarea with the longer T_c is reduced by the ratio of the T_c's (T_2/T_3).

Note #1: At a junction of two independent drainage systems that have the same T_c, the tributary flows may be added to obtain the Q_p.

$$Q_p = Q_1 + Q_2 \text{ ; when } T_1 = T_2 \text{; and } T_c = T_1 = T_2$$

This can be verified by using the junction equation above. Let Q_3, T_3, and $I_3 = 0$. When T_1 and T_2 are the same, I_1 and I_2 are also the same, and T_1/T_2 and $I_2/I_1 = 1$. T_1/T_2 and I_2/I_1 are cancelled from the equations. At this point, $Q_{T1} = Q_{T2} = Q_1 + Q_2$.

Note #2: In the upstream part of a watershed, a conservative computation is acceptable. When the times of concentration (T_c's) are relatively close in magnitude (within 10%), use the shorter T_c for the intensity and the equation $Q = \Sigma(CA)I$.

Note #3: . An optional method of determining the T_c is to use the equation
$T_c = [(\Sigma (CA)7.44\ P_6)/Q]^{1.55}$

This equation is from $Q = \Sigma(CA)I = \Sigma(CA)(7.44\ P_6/T_c^{.645})$ and solving for T_c. The advantage in this option is that the T_c is consistent with the peak flow Q, and avoids inappropriate fluctuation in downstream flows in some cases.

2.7 – Rational Method Hydrograph Procedure

The following excerpt from the County of San Diego Hydrology Manual explains the procedure followed in order to mitigate the peak 100-year flow and properly size the proposed biofiltration basins required for the site.

SECTION 6
RATIONAL METHOD HYDROGRAPH PROCEDURE

6.1 INTRODUCTION

The procedures in this section are for the development of hydrographs from RM study results for study areas up to approximately 1 square mile in size. The RM, discussed in Section 3, is a mathematical formula used to determine the maximum runoff rate from a given rainfall. It has particular application in urban storm drainage, where it is used to estimate peak runoff rates from small urban and rural watersheds for the design of storm drains and small drainage structures. However, in some instances such as for design of detention basins, the peak runoff rate is insufficient information for the design, and a hydrograph is needed. Unlike the NRCS hydrologic method (discussed in Section 4), the RM itself does not create hydrographs. The procedures for detention basin design based on RM study results were first developed as part of the East Otay Mesa Drainage Study. Rick Engineering Company performed this study under the direction of County Flood Control. The procedures in this section may be used for the development of hydrographs from RM study results for study areas up to approximately 1 square mile in size.

6.2 HYDROGRAPH DEVELOPMENT

The concept of this hydrograph procedure is based on the RM formula:

$$Q = C\ I\ A$$

Where:
- Q = peak discharge, in cubic feet per second (cfs)
- C = runoff coefficient, proportion of the rainfall that runs off the surface (no units)
- I = average rainfall intensity for a duration equal to the T_c for the area, in inches per hour
- A = drainage area contributing to the design location, in acres

The RM formula is discussed in more detail in Section 3.

An assumption of the RM is that discharge increases linearly over the T_c for the drainage area until reaching the peak discharge as defined by the RM formula, and then decreases linearly. A linear hydrograph can be developed for the peak flow occurring over the T_c as shown in Figure 6-1. However, for designs that are dependent on the total storm volume, it is not sufficient to consider a single hydrograph for peak flow occurring over the T_c at the beginning of a 6-hour storm event because the hydrograph does not account for the entire volume of runoff from the storm event. The volume under the hydrograph shown in Figure 6-1 is equal to the rainfall intensity multiplied by the duration for which that intensity occurs (T_c), the drainage area (A) contributing to the design location, and the runoff coefficient (C) for the drainage area. For designs that are dependent on the total storm volume, a hydrograph must be generated to account for the entire volume of runoff from the 6-hour storm event. The hydrograph for the entire 6-hour storm event is generated by creating a rainfall distribution consisting of blocks of rain, creating an incremental hydrograph for each block of rain, and adding the hydrographs from each block of rain. This process creates a hydrograph that contains runoff from all the blocks of rain and accounts for the entire volume of runoff from the 6-hour storm event. The total volume under the resulting hydrograph is equal to the following equation:

$$VOL = CP_6A \qquad \text{(Eq. 6-1)}$$

Where: VOL = volume of runoff (acre-inches)
P_6 = 6-hour rainfall (inches)
C = runoff coefficient
A = area of the watershed (acres)

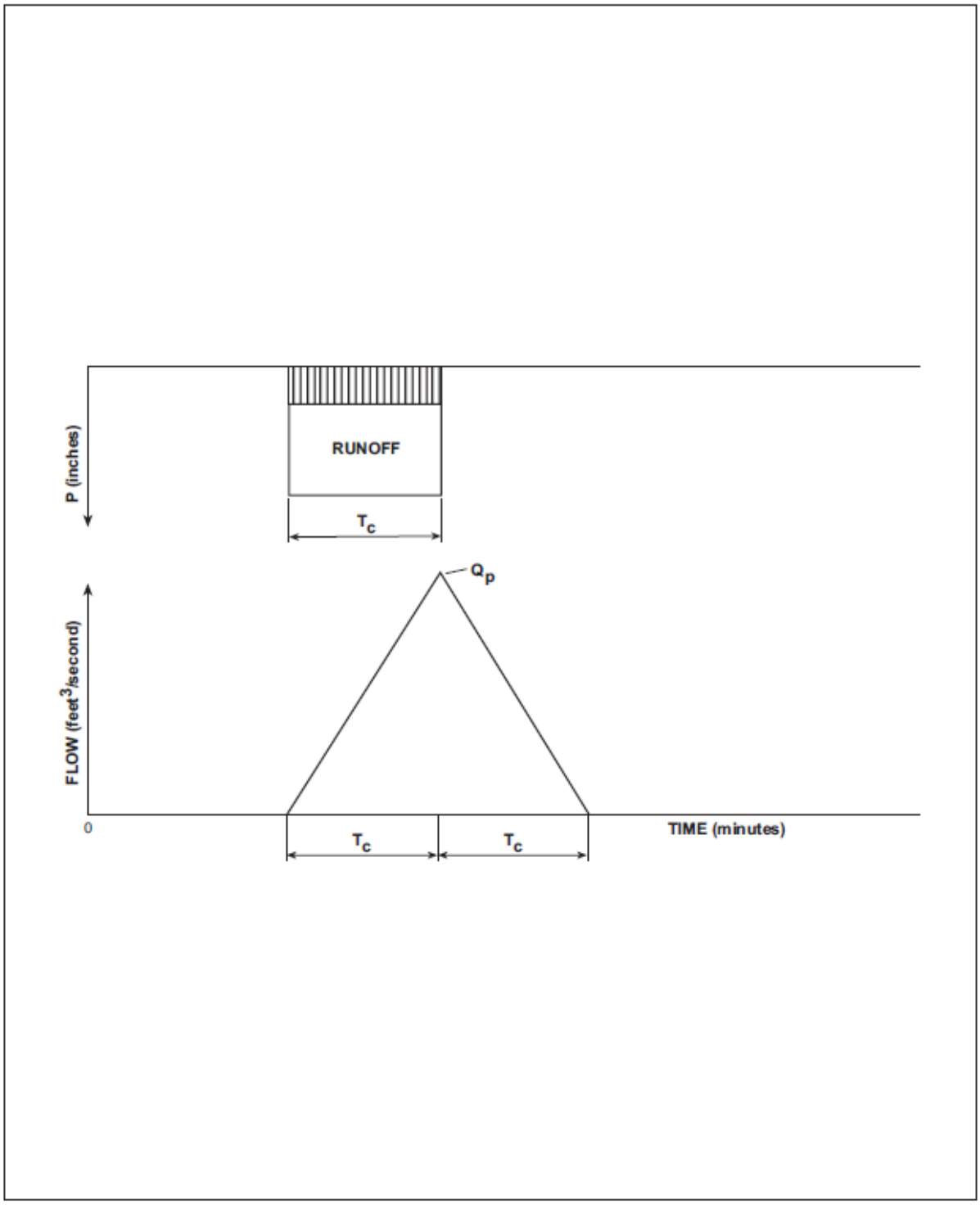

FIGURE 6-1

Triangular Hydrograph

6.2.1 Rainfall Distribution

Figure 6-2 shows a 6-hour rainfall distribution consisting of blocks of rain over increments of time equal to T_c. The number of blocks is determined by rounding T_c to the nearest whole number of minutes, dividing 360 minutes (6 hours) by T_c, and rounding again to the nearest whole number. The blocks are distributed using a (2/3, 1/3) distribution in which the peak rainfall block is placed at the 4-hour time within the 6-hour rainfall duration. The additional blocks are distributed in a sequence alternating two blocks to the left and one block to the right of the 4-hour time (see Figure 6-2). The total amount of rainfall ($P_{T(N)}$) for any given block (N) is determined as follows:

$$P_{T(N)} = (I_{T(N)}\ T_{T(N)}) / 60$$

Where: $P_{T(N)}$ = total amount of rainfall for any given block (N)
$I_{T(N)}$ = average rainfall intensity for a duration equal to $T_{T(N)}$ in inches per hour
$T_{T(N)}$ = NT_c in minutes (N is an integer representing the given block number of rainfall)

Intensity is calculated using the following equation (described in detail in Section 3):

$$I = 7.44\ P_6\ D^{-0.645}$$

Where: I = average rainfall intensity for a duration equal to D in inches per hour
P_6 = adjusted 6-hour storm rainfall
D = duration in minutes

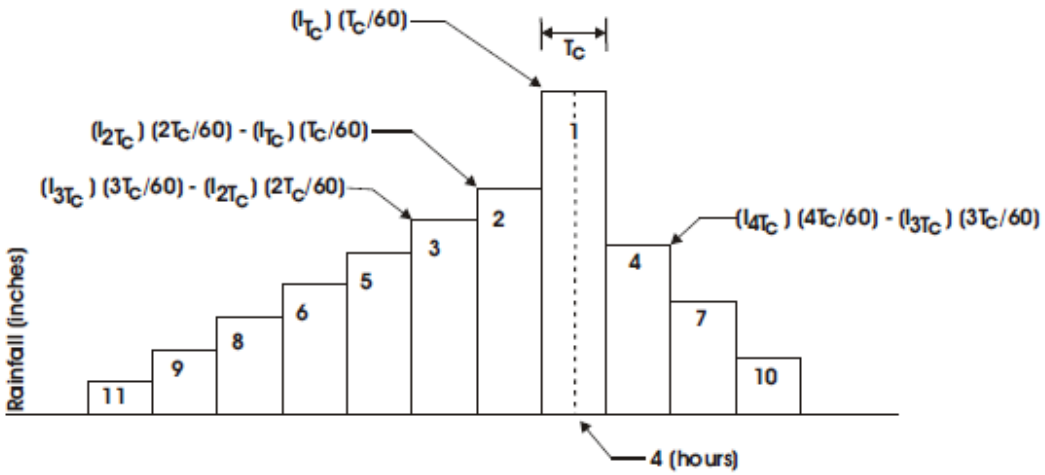

FIGURE 6-2

Rainfall Distribution

Substituting the equation for I in the equation above for $P_{T(N)}$ and setting the duration (D) equal to $T_{T(N)}$ yields:

$$P_{T(N)} = [(7.44\ P_6/T_{T(N)}^{0.645})(T_{T(N)})] / 60$$
$$P_{T(N)} = 0.124\ P_6 T_{T(N)}^{0.355}$$

Substituting NT_c for T_T (where N equals the block number of rainfall) in the equation above yields:

$$P_{T(N)} = 0.124\ P_6\ (NT_c)^{0.355} \qquad \text{(Eq. 6-2)}$$

Equation 6-2 represents the total rainfall amount for a rainfall block with a time base equal to $T_{T(N)}$ (NT_c). The actual time base of each rainfall block in the rainfall distribution is T_c, as shown in Figure 6-2. The actual rainfall amount (P_N) for each block of rain is equal to P_T at N ($P_{T(N)}$) minus the previous P_T at N–1 ($P_{T(N-1)}$) at any given multiple of T_c (any NT_c). For example, the rainfall for block 2 is equal to $P_{T(N)}$ at $T_{T(N)} = 2T_c$ minus the $P_{T(N)}$ at $T_{T(N)} = 1T_c$, and the rainfall for block 3 equals $P_{T(N)}$ at $T_{T(N)} = 3T_c$ minus the $P_{T(N)}$ at $T_{T(N)} = 2T_c$, or P_N can be represented by the following equation:

$$P_N = P_{T(N)} - P_{T(N-1)} \qquad \text{(Eq. 6-3)}$$

For the rainfall distribution, the rainfall at block N = 1, ($1T_c$), is centered at 4 hours, the rainfall at block N = 2, ($2T_c$), is centered at 4 hours – $1T_c$, the rainfall at block N = 3, ($3T_c$), is centered at 4 hours – $2T_c$, and the rainfall at at block N = 4, ($4T_c$), is centered at 4 hours + $1T_c$. The sequence continues alternating two blocks to the left and one block to the right (see Figure 6-2).

2.8 –Generating a Hydrograph

The County of San Diego Hydrology Manual encourages the use of Rick Engineering's RATHYDRO computer program for generating hydrographs. The excerpt below explains the procedure for developing a hydrograph using this software. The results of this analysis can be found in Chapter 6 of this report.

6.3 Generating a Hydrograph Using RATHYDRO

The rainfall distribution and related hydrographs can be developed using the RATHYDRO computer program provided to the County by Rick Engineering Company. A copy of this program is available at no cost from the County. The output from this computer program may be used with HEC-1 or other software for routing purposes.

The design storm pattern used by the RATHYDRO program is based on the (2/3, 1/3) distribution described in Sections 4.1.1 and 6.2.1. The ordinates on the hydrograph are calculated based on the County of San Diego Intensity-Duration Design Chart (Figure 3-1), which uses the intensity equation described in Sections 3.1.3 and 6.2.1 to relate the intensity (I) of the storm to T_c, $I = 7.44\ P_6 D^{-0.645}$. The computer program uses equations 6-2 and 6-3 described above and calculates I_N directly. The intensity at any given multiple of T_c is calculated by the following equation:

$$I_N = [(I_{T(N)})\ (T_{T(N)}) - (I_{T(N-1)})\ (T_{T(N-1)})] \ / \ T_c \qquad \text{(Eq. 6-6)}$$

Where: N = number of rainfall blocks

$T_{T(N)}$ = time of concentration at rainfall block N in minutes (equal to NT_c)

I_N = actual rainfall intensity at rainfall block N in inches per hour

$I_{T(N)}$ = rainfall intensity at time of concentration $T_{T(N)}$ in inches per hour

Figure 6-2 shows the rainfall distribution used in the RM hydrograph, computed at multiples of T_c. The rainfall at block N = 1, ($1T_c$), is centered at 4 hours, the rainfall at block N = 2, ($2T_c$), is centered at 4 hours – $1T_c$, the rainfall at block N = 3, ($3T_c$), is centered at 4 hours – $2T_c$, and the rainfall at at block N = 4, ($4T_c$), is centered at 4 hours + $1T_c$. The sequence continues alternating two blocks to the left and one block to the right (see Figure 6-2).

As described in Section 6.2.2, the peak discharge (Q_N) of the hydrograph for any given rainfall block (N) is determined by the RM formula Q = CIA, where $I = I_N$ = the actual

rainfall intensity for the rainfall block. The RATHYDRO program substitutes equation 6-6 into the RM formula to determine Q_N yielding the following equation:

$$Q_N = [(I_{T(N)})(T_{T(N)}) - (I_{T(N-1)})(T_{T(N-1)})]\, CA / T_c \qquad \text{(Eq. 6-7)}$$

Where: Q_N = peak discharge for rainfall block N in cubic feet per second (cfs)
N = number of rainfall blocks
$T_{T(N)}$ = time of concentration at rainfall block N in minutes (equal to NT_c)
$I_{T(N)}$ = rainfall intensity at time of concentration $T_{T(N)}$ in inches per hour
C = RM runoff coefficient
A = area of the watershed (acres)

To develop the hydrograph for the 6-hour design storm, a series of triangular hydrographs with ordinates at multiples of the given T_c are created and added to create the hydrograph. This hydrograph has its peak at 4 hours plus ½ of the T_c. The total volume under the hydrograph is equal to the following equation (equation 6-1):

$$VOL = CP_6A$$

Where: VOL = volume of runoff (acre-inches)
P_6 = 6-hour rainfall (inches)
C = runoff coefficient
A = area of the watershed (acres)

CHAPTER 3 – 100 YEAR HYDROLOGIC ANALYSIS FOR EXISTING CONDITIONS

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

            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 1643

                              Analysis prepared by:

                                REC CONSULTANTS, INC.
                                     2442 2ND AVE
                                 SAN DIEGO, CA 92101

 ************************* DESCRIPTION OF STUDY *************************
* EXISTING CONDITIONS HYDROLOGY                                         *
* 100-YEAR STORM                                                        *
* LANTERN CREST RIDGE ADDITION                                          *
 *************************************************************************

  FILE NAME: 1384PRE.DAT
  TIME/DATE OF STUDY: 11:01 04/01/2019
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.530
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
  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   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

+------------------------------------------------------------------------+
| NODE 100 REPRESENTS OFFSITE FLOWS AS DETERMINED BY SEPARATE PERMIT      |
| NODES 1000 AND 2000 CORRESPOND TO POC-1 AND POC-2, RESPECTIVELY         |
|                                                                        |
+------------------------------------------------------------------------+

**************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==========================================================================
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
```

```
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    710.00
  DOWNSTREAM ELEVATION(FEET) =    695.00
  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) =  5.762
  SUBAREA RUNOFF(CFS) =      0.20
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.20

****************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    695.00  DOWNSTREAM(FEET) =    500.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   512.00   CHANNEL SLOPE =  0.3809
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.590
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.41
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.22
  AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =   2.65
  Tc(MIN.) =    8.92
  SUBAREA AREA(ACRES) =     1.49       SUBAREA RUNOFF(CFS) =    2.39
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =        1.6         PEAK FLOW RATE(CFS) =       2.55

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   3.87
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     612.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 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) =   4.59
  TOTAL STREAM AREA(ACRES) =     1.59
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.55

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      3.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6600
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  77
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   117.00
  UPSTREAM ELEVATION(FEET) =    509.00
  DOWNSTREAM ELEVATION(FEET) =    500.00
  ELEVATION DIFFERENCE(FEET) =      9.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.966
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    97.69
           (Reference: Table 3-1B of Hydrology Manual)
```

```
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.666
 NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
 SUBAREA RUNOFF(CFS) =      0.53
 TOTAL AREA(ACRES) =      0.12   TOTAL RUNOFF(CFS) =      0.53

****************************************************************************
 FLOW PROCESS FROM NODE      3.00 TO NODE      3.00 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.) =    3.97
 RAINFALL INTENSITY(INCH/HR) =   6.67
 TOTAL STREAM AREA(ACRES) =     0.12
 PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.53

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        2.55     8.92        4.590          1.59
     2        0.53     3.97        6.666          0.12

 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        1.66     3.97       6.666
     2        2.92     8.92       4.590

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =       2.92   Tc(MIN.) =    8.92
 TOTAL AREA(ACRES) =        1.7
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     612.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      3.00 TO NODE   1000.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  500.00  DOWNSTREAM ELEVATION(FEET) =  436.00
 STREET LENGTH(FEET) =   722.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 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) =       6.36
   STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
   STREET FLOW DEPTH(FEET) =  0.28
   HALFSTREET FLOOD WIDTH(FEET) =    6.47
   AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.61
   PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.56
 STREET FLOW TRAVEL TIME(MIN.) =   2.15   Tc(MIN.) =   11.06
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.994
 RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6600
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  77
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.546
 SUBAREA AREA(ACRES) =    2.62      SUBAREA RUNOFF(CFS) =    6.91
 TOTAL AREA(ACRES) =        4.3        PEAK FLOW RATE(CFS) =       9.45

 END OF SUBAREA STREET FLOW HYDRAULICS:
 DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   8.09
 FLOW VELOCITY(FEET/SEC.) =  6.06   DEPTH*VELOCITY(FT*FT/SEC.) =   1.86
 LONGEST FLOWPATH FROM NODE      1.00 TO NODE   1000.00 =    1334.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE   1000.00 TO NODE   1000.00 IS CODE =  10
----------------------------------------------------------------------------
 >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
 FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  88
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
 UPSTREAM ELEVATION(FEET) =    710.00
 DOWNSTREAM ELEVATION(FEET) =    686.00
 ELEVATION DIFFERENCE(FEET) =     24.00
 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) =  5.762
 SUBAREA RUNOFF(CFS) =      0.10
 TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.10

****************************************************************************
 FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  51
----------------------------------------------------------------------------
 >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
 >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =    686.00  DOWNSTREAM(FEET) =    491.00
 CHANNEL LENGTH THRU SUBAREA(FEET) =   541.00   CHANNEL SLOPE =  0.3604
 CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   5.000
 MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   2.00
  100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.651
 NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
 SOIL CLASSIFICATION IS "D"
 S.C.S. CURVE NUMBER (AMC II) =  88
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.89
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.65
 AVERAGE FLOW DEPTH(FEET) =   0.05   TRAVEL TIME(MIN.) =   2.47
 Tc(MIN.) =    8.74
 SUBAREA AREA(ACRES) =     2.18       SUBAREA RUNOFF(CFS) =    3.55
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
 TOTAL AREA(ACRES) =        2.2         PEAK FLOW RATE(CFS) =       3.63

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.08   FLOW VELOCITY(FEET/SEC.) =   4.41
 LONGEST FLOWPATH FROM NODE      5.00 TO NODE      7.00 =     641.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 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.) =    8.74
  RAINFALL INTENSITY(INCH/HR) =   4.65
  TOTAL STREAM AREA(ACRES) =     2.23
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.63

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      7.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6600
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  77
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   148.00
  UPSTREAM ELEVATION(FEET) =    498.00
  DOWNSTREAM ELEVATION(FEET) =    491.00
  ELEVATION DIFFERENCE(FEET) =      7.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.583
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    94.32
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.666
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.62
  TOTAL AREA(ACRES) =      0.14   TOTAL RUNOFF(CFS) =      0.62

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      7.00 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.) =    4.58
  RAINFALL INTENSITY(INCH/HR) =   6.67
  TOTAL STREAM AREA(ACRES) =     0.14
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.62

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    536.00
  DOWNSTREAM ELEVATION(FEET) =    516.00
  ELEVATION DIFFERENCE(FEET) =     20.00
  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) =  5.762
  SUBAREA RUNOFF(CFS) =      0.26
  TOTAL AREA(ACRES) =      0.13   TOTAL RUNOFF(CFS) =      0.26

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  51
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    516.00  DOWNSTREAM(FEET) =    494.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   125.00   CHANNEL SLOPE =  0.1760
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.215
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.83
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.99
  AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =   1.05
  Tc(MIN.) =    7.32
  SUBAREA AREA(ACRES) =     0.62       SUBAREA RUNOFF(CFS) =    1.13
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =        0.8         PEAK FLOW RATE(CFS) =       1.37

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   2.37
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =     225.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE      7.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    494.00  DOWNSTREAM(FEET) =    491.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    93.00   CHANNEL SLOPE =  0.0323
  CHANNEL BASE(FEET) =    4.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.030
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6600
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  77
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.49
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.68
  AVERAGE FLOW DEPTH(FEET) =   0.10   TRAVEL TIME(MIN.) =   0.42
  Tc(MIN.) =    7.74
  SUBAREA AREA(ACRES) =     0.07       SUBAREA RUNOFF(CFS) =    0.23
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.376
  TOTAL AREA(ACRES) =        0.8         PEAK FLOW RATE(CFS) =       1.55

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.10   FLOW VELOCITY(FEET/SEC.) =   3.62
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE      7.00 =     318.00 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 =  3
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  3 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.74
  RAINFALL INTENSITY(INCH/HR) =   5.03
  TOTAL STREAM AREA(ACRES) =     0.82
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.55

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

```
      1        3.63     8.74        4.651          2.23
      2        0.62     4.58        6.666          0.14
      3        1.55     7.74        5.030          0.82

  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        3.44     4.58       6.666
      2        5.23     7.74       5.030
      3        5.50     8.74       4.651

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.50   Tc(MIN.) =    8.74
  TOTAL AREA(ACRES) =        3.2
  LONGEST FLOWPATH FROM NODE      5.00 TO NODE      7.00 =     641.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 TO NODE      9.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  491.00  DOWNSTREAM ELEVATION(FEET) =  439.00
  STREET LENGTH(FEET) =   609.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  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) =       9.12
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =    8.03
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.92
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.81
  STREET FLOW TRAVEL TIME(MIN.) =   1.71   Tc(MIN.) =   10.45
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.143
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6600
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  77
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.502
  SUBAREA AREA(ACRES) =    2.66      SUBAREA RUNOFF(CFS) =    7.27
  TOTAL AREA(ACRES) =        5.9        PEAK FLOW RATE(CFS) =      12.17

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =   9.34
  FLOW VELOCITY(FEET/SEC.) =  6.25   DEPTH*VELOCITY(FT*FT/SEC.) =   2.06
  LONGEST FLOWPATH FROM NODE      5.00 TO NODE      9.00 =    1250.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE   1000.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  439.00  DOWNSTREAM ELEVATION(FEET) =  436.00
```

```
  STREET LENGTH(FEET) =   298.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  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) =      12.72
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.53
    HALFSTREET FLOOD WIDTH(FEET) =   20.43
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.24
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.71
  STREET FLOW TRAVEL TIME(MIN.) =   1.53   Tc(MIN.) =   11.98
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.794
  GENERAL COMMERCIAL RUNOFF COEFFICIENT = .8000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  89
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.519
  SUBAREA AREA(ACRES) =    0.36      SUBAREA RUNOFF(CFS) =    1.09
  TOTAL AREA(ACRES) =        6.2        PEAK FLOW RATE(CFS) =      12.24

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.52   HALFSTREET FLOOD WIDTH(FEET) =  20.12
  FLOW VELOCITY(FEET/SEC.) =  3.21   DEPTH*VELOCITY(FT*FT/SEC.) =   1.68
  LONGEST FLOWPATH FROM NODE      5.00 TO NODE   1000.00 =    1548.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1000.00 TO NODE   1000.00 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       12.24    11.98       3.794        6.21
  LONGEST FLOWPATH FROM NODE      5.00 TO NODE   1000.00 =    1548.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        9.45    11.06       3.994        4.33
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE   1000.00 =    1334.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      20.74      11.06        3.994
      2      21.21      11.98        3.794

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      21.21   Tc(MIN.) =   11.98
  TOTAL AREA(ACRES) =       10.5

****************************************************************************
  FLOW PROCESS FROM NODE   1000.00 TO NODE   1000.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     14.00 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) =   100.00
  UPSTREAM ELEVATION(FEET) =    536.00
  DOWNSTREAM ELEVATION(FEET) =    523.00
  ELEVATION DIFFERENCE(FEET) =     13.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.846
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.666
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.08   TOTAL RUNOFF(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    523.00  DOWNSTREAM(FEET) =    490.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   106.00   CHANNEL SLOPE =  0.3113
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.286
  RESIDENTIAL (4.3 DU/AC OR LESS) RUNOFF COEFFICIENT = .5200
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  86
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.01
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.80
  AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =   0.63
  Tc(MIN.) =    5.48
  SUBAREA AREA(ACRES) =     0.45       SUBAREA RUNOFF(CFS) =    1.47
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.520
  TOTAL AREA(ACRES) =        0.5         PEAK FLOW RATE(CFS) =       1.73

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.05   FLOW VELOCITY(FEET/SEC.) =   3.34
  LONGEST FLOWPATH FROM NODE     13.00 TO NODE     15.00 =     206.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 TO NODE    101.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  490.00  DOWNSTREAM ELEVATION(FEET) =  445.00
  STREET LENGTH(FEET) =   542.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  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) =       2.81
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    6.09
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.35
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.45
  STREET FLOW TRAVEL TIME(MIN.) =   1.69   Tc(MIN.) =    7.16
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.285
  GENERAL COMMERCIAL RUNOFF COEFFICIENT = .8000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  89
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.657
  SUBAREA AREA(ACRES) =    0.51      SUBAREA RUNOFF(CFS) =    2.16
  TOTAL AREA(ACRES) =        1.0        PEAK FLOW RATE(CFS) =       3.61

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   7.09
  FLOW VELOCITY(FEET/SEC.) =  5.62   DEPTH*VELOCITY(FT*FT/SEC.) =   1.62
  LONGEST FLOWPATH FROM NODE     13.00 TO NODE    101.00 =     748.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    101.00 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.) =    7.16
  RAINFALL INTENSITY(INCH/HR) =   5.29
  TOTAL STREAM AREA(ACRES) =     1.04
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.61

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6600
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  77
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    480.00
  DOWNSTREAM ELEVATION(FEET) =    475.00
  ELEVATION DIFFERENCE(FEET) =      5.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.515
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    95.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.666
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.35
  TOTAL AREA(ACRES) =      0.08   TOTAL RUNOFF(CFS) =      0.35

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE    101.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  475.00  DOWNSTREAM ELEVATION(FEET) =  445.00
  STREET LENGTH(FEET) =   509.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
```

```
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  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) =       4.57
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    5.91
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.52
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.21
  STREET FLOW TRAVEL TIME(MIN.) =   1.88   Tc(MIN.) =    6.39
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.690
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6600
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  77
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.660
  SUBAREA AREA(ACRES) =    2.24      SUBAREA RUNOFF(CFS) =    8.41
  TOTAL AREA(ACRES) =        2.3        PEAK FLOW RATE(CFS) =       8.71

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =   8.66
  FLOW VELOCITY(FEET/SEC.) =  5.05   DEPTH*VELOCITY(FT*FT/SEC.) =   1.60
  LONGEST FLOWPATH FROM NODE     16.00 TO NODE    101.00 =     609.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    101.00 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.) =    6.39
  RAINFALL INTENSITY(INCH/HR) =   5.69
  TOTAL STREAM AREA(ACRES) =     2.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.71

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    100.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   5.00   RAIN INTENSITY(INCH/HOUR) =  6.67
  TOTAL AREA(ACRES) =    50.27   TOTAL RUNOFF(CFS) =     45.86

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   474.00  DOWNSTREAM(FEET) =   440.00
  FLOW LENGTH(FEET) =   552.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  13.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.66
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      45.86
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =    5.47
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE    101.00 =     870.00 FEET.

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

```
  FLOW PROCESS FROM NODE    101.00 TO NODE    101.00 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.) =    5.47
  RAINFALL INTENSITY(INCH/HR) =   6.29
  TOTAL STREAM AREA(ACRES) =    50.27
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     45.86

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        3.61     7.16        5.285          1.04
      2        8.71     6.39        5.690          2.32
      3       45.86     5.47        6.292         50.27

  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       56.07     5.47       6.292
      2       53.41     6.39       5.690
      3       50.23     7.16       5.285

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      56.07   Tc(MIN.) =    5.47
  TOTAL AREA(ACRES) =       53.6
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE    101.00 =     870.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE   2000.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   440.00  DOWNSTREAM(FEET) =   433.00
  FLOW LENGTH(FEET) =   360.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  20.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.50
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      56.07
  PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =    5.91
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE   2000.00 =    1230.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2000.00 TO NODE   2000.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     18.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6600
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  77
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    480.00
```

```
  DOWNSTREAM ELEVATION(FEET) =    478.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.444
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    75.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.310
  SUBAREA RUNOFF(CFS) =      0.54
  TOTAL AREA(ACRES) =      0.13   TOTAL RUNOFF(CFS) =      0.54

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  478.00  DOWNSTREAM ELEVATION(FEET) =  454.00
  STREET LENGTH(FEET) =   485.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  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) =       4.21
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    5.97
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.11
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.11
  STREET FLOW TRAVEL TIME(MIN.) =   1.96   Tc(MIN.) =    7.41
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.173
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6600
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  77
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.660
  SUBAREA AREA(ACRES) =    2.14      SUBAREA RUNOFF(CFS) =    7.31
  TOTAL AREA(ACRES) =        2.3        PEAK FLOW RATE(CFS) =       7.75

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   8.53
  FLOW VELOCITY(FEET/SEC.) =  4.59   DEPTH*VELOCITY(FT*FT/SEC.) =   1.45
  LONGEST FLOWPATH FROM NODE     16.00 TO NODE     19.00 =     585.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE     20.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  454.00  DOWNSTREAM ELEVATION(FEET) =  440.00
  STREET LENGTH(FEET) =   660.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  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) =       8.67
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.43
    HALFSTREET FLOOD WIDTH(FEET) =   15.04
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.92
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.69
  STREET FLOW TRAVEL TIME(MIN.) =   2.81   Tc(MIN.) =   10.22
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.205
  GENERAL COMMERCIAL RUNOFF COEFFICIENT = .8000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  89
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.687
  SUBAREA AREA(ACRES) =    0.55      SUBAREA RUNOFF(CFS) =    1.85
  TOTAL AREA(ACRES) =        2.8        PEAK FLOW RATE(CFS) =       8.15

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  14.65
  FLOW VELOCITY(FEET/SEC.) =  3.86   DEPTH*VELOCITY(FT*FT/SEC.) =   1.64
  LONGEST FLOWPATH FROM NODE     16.00 TO NODE     20.00 =    1245.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 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.) =   10.22
  RAINFALL INTENSITY(INCH/HR) =   4.20
  TOTAL STREAM AREA(ACRES) =     2.82
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.15

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     22.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6600
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  77
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    495.00
  DOWNSTREAM ELEVATION(FEET) =    478.00
  ELEVATION DIFFERENCE(FEET) =     17.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.676
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.666
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.53
  TOTAL AREA(ACRES) =      0.12   TOTAL RUNOFF(CFS) =      0.53

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     20.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    478.00  DOWNSTREAM(FEET) =    440.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   543.00   CHANNEL SLOPE =  0.0700
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   2.00
```

```
 100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.713
 RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6600
 SOIL CLASSIFICATION IS "A"
 S.C.S. CURVE NUMBER (AMC II) =  77
 TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.57
 TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.38
 AVERAGE FLOW DEPTH(FEET) =   0.18   TRAVEL TIME(MIN.) =   2.67
 Tc(MIN.) =    6.35
 SUBAREA AREA(ACRES) =     3.17       SUBAREA RUNOFF(CFS) =   11.95
 AREA-AVERAGE RUNOFF COEFFICIENT =  0.660
 TOTAL AREA(ACRES) =        3.3         PEAK FLOW RATE(CFS) =      12.41

 END OF SUBAREA CHANNEL FLOW HYDRAULICS:
 DEPTH(FEET) =  0.26   FLOW VELOCITY(FEET/SEC.) =   4.29
 LONGEST FLOWPATH FROM NODE     21.00 TO NODE     20.00 =     643.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE     20.00 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.) =    6.35
 RAINFALL INTENSITY(INCH/HR) =   5.71
 TOTAL STREAM AREA(ACRES) =     3.29
 PEAK FLOW RATE(CFS) AT CONFLUENCE =     12.41

 ** CONFLUENCE DATA **
 STREAM     RUNOFF       Tc      INTENSITY      AREA
 NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
     1        8.15    10.22        4.205          2.82
     2       12.41     6.35        5.713          3.29

 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       17.47     6.35       5.713
     2       17.28    10.22       4.205

 COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
 PEAK FLOW RATE(CFS) =      17.47   Tc(MIN.) =    6.35
 TOTAL AREA(ACRES) =        6.1
 LONGEST FLOWPATH FROM NODE     16.00 TO NODE     20.00 =    1245.00 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     20.00 TO NODE   2000.00 IS CODE =  62
----------------------------------------------------------------------------
 >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
 UPSTREAM ELEVATION(FEET) =  440.00  DOWNSTREAM ELEVATION(FEET) =  438.00
 STREET LENGTH(FEET) =   128.00   CURB HEIGHT(INCHES) =  8.0
 STREET HALFWIDTH(FEET) = 30.00

 DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
 INSIDE STREET CROSSFALL(DECIMAL) =  0.018
 OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

 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) =      17.67
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.54
    HALFSTREET FLOOD WIDTH(FEET) =   21.29
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.17
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.26
  STREET FLOW TRAVEL TIME(MIN.) =   0.51   Tc(MIN.) =    6.86
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.434
  GENERAL COMMERCIAL RUNOFF COEFFICIENT = .8000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  89
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.674
  SUBAREA AREA(ACRES) =    0.09      SUBAREA RUNOFF(CFS) =    0.39
  TOTAL AREA(ACRES) =        6.2        PEAK FLOW RATE(CFS) =      22.72

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.58   HALFSTREET FLOOD WIDTH(FEET) =  23.55
  FLOW VELOCITY(FEET/SEC.) =  4.41   DEPTH*VELOCITY(FT*FT/SEC.) =   2.57
  LONGEST FLOWPATH FROM NODE     16.00 TO NODE   2000.00 =    1373.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2000.00 TO NODE   2000.00 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       22.72     6.86       5.434        6.20
  LONGEST FLOWPATH FROM NODE     16.00 TO NODE   2000.00 =    1373.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       56.07     5.91       5.983       53.63
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE   2000.00 =    1230.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      75.65       5.91        5.983
      2      73.66       6.86        5.434

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      75.65   Tc(MIN.) =    5.91
  TOTAL AREA(ACRES) =       59.8

****************************************************************************
  FLOW PROCESS FROM NODE   2000.00 TO NODE   2000.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       59.8  TC(MIN.) =      5.91
  PEAK FLOW RATE(CFS)   =      75.65
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

CHAPTER 4 – 100 YEAR HYDROLOGIC ANALYSIS FOR UNMITIGATED CONDITIONS

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

            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 1643

                              Analysis prepared by:

                                   REC CONSULTANTS, INC.
                                        2442 2ND AVE
                                    SAN DIEGO, CA 92101

 ************************* DESCRIPTION OF STUDY *************************
* PROPOSED CONDITIONS HYDROLOGY - UNMITIGATED                           *
* 100-YEAR STORM                                                        *
* LANTERN CREST RIDGE ADDITION                                          *
 ************************************************************************

  FILE NAME: 1384PSTU.DAT
  TIME/DATE OF STUDY: 10:36 04/01/2019
--------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
--------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.530
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
  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   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

+------------------------------------------------------------------------+
| NODES 1000 AND 2000 CORRESPOND TO POC-1 AND POC-2, RESPECTIVELY        |
| 100 SERIES NODES REPRESENT PROP. STORM DRAIN; 200 SERIES NODES REPRESENT |
| THE PROPOSED BASIN; 300 SERIES NODES REPRESENT EX. STORM DRAIN         |
+------------------------------------------------------------------------+

**************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
--------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
==========================================================================
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    710.00
  DOWNSTREAM ELEVATION(FEET) =    695.00
  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) =  5.762
  SUBAREA RUNOFF(CFS) =      0.20
  TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.20

**************************************************************************
  FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    695.00  DOWNSTREAM(FEET) =    525.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   433.00   CHANNEL SLOPE =  0.3926
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.589
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.98
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.72
  AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =   2.65
  Tc(MIN.) =    8.92
  SUBAREA AREA(ACRES) =     0.96       SUBAREA RUNOFF(CFS) =    1.54
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =       1.70

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.05   FLOW VELOCITY(FEET/SEC.) =   3.42
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     533.00 FEET.

**************************************************************************
  FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  51
--------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
==========================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    525.00  DOWNSTREAM(FEET) =    500.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   125.00   CHANNEL SLOPE =  0.2000
  CHANNEL BASE(FEET) =    4.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.496
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.97
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.25
  AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   0.29
  Tc(MIN.) =    9.21
  SUBAREA AREA(ACRES) =     0.34       SUBAREA RUNOFF(CFS) =    0.54
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =        1.4         PEAK FLOW RATE(CFS) =       2.20
```

```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.07   FLOW VELOCITY(FEET/SEC.) =   7.43
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     658.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 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.) =    9.21
  RAINFALL INTENSITY(INCH/HR) =   4.50
  TOTAL STREAM AREA(ACRES) =     1.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.20

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =    517.90
  DOWNSTREAM ELEVATION(FEET) =    516.60
  ELEVATION DIFFERENCE(FEET) =      1.30
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.970
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    72.33
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.666
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.06   TOTAL RUNOFF(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  516.60  DOWNSTREAM ELEVATION(FEET) =  515.90
  STREET LENGTH(FEET) =   121.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  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) =       0.65
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.26
```

```
     HALFSTREET FLOOD WIDTH(FEET) =    5.47
     AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.40
     PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.37
   STREET FLOW TRAVEL TIME(MIN.) =   1.44   Tc(MIN.) =    6.41
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.681
   RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
   SOIL CLASSIFICATION IS "D"
   S.C.S. CURVE NUMBER (AMC II) =  92
   AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
   SUBAREA AREA(ACRES) =    0.18      SUBAREA RUNOFF(CFS) =    0.73
   TOTAL AREA(ACRES) =        0.2        PEAK FLOW RATE(CFS) =       0.97

   END OF SUBAREA STREET FLOW HYDRAULICS:
   DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   7.16
   FLOW VELOCITY(FEET/SEC.) =  1.49   DEPTH*VELOCITY(FT*FT/SEC.) =   0.43
   LONGEST FLOWPATH FROM NODE      5.00 TO NODE      7.00 =     196.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE      7.00 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) =   505.90  DOWNSTREAM(FEET) =   500.00
   FLOW LENGTH(FEET) =    61.00   MANNING'S N =  0.013
   DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.2 INCHES
   PIPE-FLOW VELOCITY(FEET/SEC.) =   8.92
   ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
   PIPE-FLOW(CFS) =       0.97
   PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    6.52
   LONGEST FLOWPATH FROM NODE      5.00 TO NODE      4.00 =     257.00 FEET.

****************************************************************************
   FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 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.) =    6.52
   RAINFALL INTENSITY(INCH/HR) =   5.62
   TOTAL STREAM AREA(ACRES) =     0.24
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.97

****************************************************************************
   FLOW PROCESS FROM NODE      8.00 TO NODE      4.00 IS CODE =  21
----------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
   RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6600
   SOIL CLASSIFICATION IS "A"
   S.C.S. CURVE NUMBER (AMC II) =  77
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   117.00
   UPSTREAM ELEVATION(FEET) =    509.00
   DOWNSTREAM ELEVATION(FEET) =    500.00
   ELEVATION DIFFERENCE(FEET) =      9.00
   SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.966
   WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
            THE MAXIMUM OVERLAND FLOW LENGTH =    97.69
            (Reference: Table 3-1B of Hydrology Manual)
            THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
```

```
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.666
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.53
  TOTAL AREA(ACRES) =      0.12   TOTAL RUNOFF(CFS) =      0.53

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 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.) =    3.97
  RAINFALL INTENSITY(INCH/HR) =   6.67
  TOTAL STREAM AREA(ACRES) =     0.12
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.53

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        2.20     9.21        4.496          1.40
      2        0.97     6.52        5.617          0.24
      3        0.53     3.97        6.666          0.12

  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        2.07     3.97       6.666
      2        2.97     6.52       5.617
      3        3.33     9.21       4.496

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       3.33   Tc(MIN.) =    9.21
  TOTAL AREA(ACRES) =        1.8
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     658.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE   1000.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  500.00  DOWNSTREAM ELEVATION(FEET) =  436.00
  STREET LENGTH(FEET) =   722.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  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) =       6.72
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
```

```
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    6.66
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.70
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.61
  STREET FLOW TRAVEL TIME(MIN.) =   2.11   Tc(MIN.) =   11.32
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.936
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6600
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  77
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.564
  SUBAREA AREA(ACRES) =    2.62      SUBAREA RUNOFF(CFS) =    6.81
  TOTAL AREA(ACRES) =        4.4        PEAK FLOW RATE(CFS) =       9.72

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   8.22
  FLOW VELOCITY(FEET/SEC.) =  6.10   DEPTH*VELOCITY(FT*FT/SEC.) =   1.89
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE   1000.00 =    1380.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1000.00 TO NODE   1000.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    710.00
  DOWNSTREAM ELEVATION(FEET) =    686.00
  ELEVATION DIFFERENCE(FEET) =     24.00
  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) =  5.762
  SUBAREA RUNOFF(CFS) =      0.10
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.10

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    686.00  DOWNSTREAM(FEET) =    554.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   331.00   CHANNEL SLOPE =  0.3988
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.901
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.29
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.08
  AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =   1.79
  Tc(MIN.) =    8.06
  SUBAREA AREA(ACRES) =     1.37       SUBAREA RUNOFF(CFS) =    2.35
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =        1.4         PEAK FLOW RATE(CFS) =       2.44

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   4.07
  LONGEST FLOWPATH FROM NODE      9.00 TO NODE     11.00 =     431.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE    100.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    554.00  DOWNSTREAM(FEET) =    552.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    33.00   CHANNEL SLOPE =  0.0606
  CHANNEL BASE(FEET) =    4.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.861
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.47
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.34
  AVERAGE FLOW DEPTH(FEET) =   0.11   TRAVEL TIME(MIN.) =   0.10
  Tc(MIN.) =    8.16
  SUBAREA AREA(ACRES) =     0.02       SUBAREA RUNOFF(CFS) =    0.07
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.355
  TOTAL AREA(ACRES) =        1.4         PEAK FLOW RATE(CFS) =       2.48

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.11   FLOW VELOCITY(FEET/SEC.) =   5.37
  LONGEST FLOWPATH FROM NODE      9.00 TO NODE    100.00 =     464.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   548.50  DOWNSTREAM(FEET) =   525.80
  FLOW LENGTH(FEET) =   128.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   3.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.19
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.48
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =    8.31
  LONGEST FLOWPATH FROM NODE      9.00 TO NODE    101.00 =     592.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   525.80  DOWNSTREAM(FEET) =   513.90
  FLOW LENGTH(FEET) =    79.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   3.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.36
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.48
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    8.41
```

```
  LONGEST FLOWPATH FROM NODE      9.00 TO NODE    102.00 =     671.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 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.) =    8.41
  RAINFALL INTENSITY(INCH/HR) =   4.77
  TOTAL STREAM AREA(ACRES) =     1.44
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.48

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    565.00
  DOWNSTREAM ELEVATION(FEET) =    533.00
  ELEVATION DIFFERENCE(FEET) =     32.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.259
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.666
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.33
  TOTAL AREA(ACRES) =      0.07   TOTAL RUNOFF(CFS) =      0.33

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE    102.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    533.00  DOWNSTREAM(FEET) =    532.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   280.00   CHANNEL SLOPE =  0.0036
  CHANNEL BASE(FEET) =    4.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.778
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.95
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.57
  AVERAGE FLOW DEPTH(FEET) =   0.14   TRAVEL TIME(MIN.) =   2.98
  Tc(MIN.) =    6.24
  SUBAREA AREA(ACRES) =     0.30       SUBAREA RUNOFF(CFS) =    1.23
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  TOTAL AREA(ACRES) =        0.4         PEAK FLOW RATE(CFS) =       1.52

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.19   FLOW VELOCITY(FEET/SEC.) =   1.85
  LONGEST FLOWPATH FROM NODE     12.00 TO NODE    102.00 =     380.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 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.) =    6.24
  RAINFALL INTENSITY(INCH/HR) =   5.78
  TOTAL STREAM AREA(ACRES) =     0.37
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.52

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        2.48     8.41        4.768          1.44
      2        1.52     6.24        5.778          0.37

  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        3.36     6.24       5.778
      2        3.74     8.41       4.768

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       3.74   Tc(MIN.) =    8.41
  TOTAL AREA(ACRES) =        1.8
  LONGEST FLOWPATH FROM NODE      9.00 TO NODE    102.00 =     671.00 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) =   513.90  DOWNSTREAM(FEET) =   492.30
  FLOW LENGTH(FEET) =   144.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.78
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.74
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =    8.57
  LONGEST FLOWPATH FROM NODE      9.00 TO NODE    103.00 =     815.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 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.) =    8.57
  RAINFALL INTENSITY(INCH/HR) =   4.71
  TOTAL STREAM AREA(ACRES) =     1.81
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.74

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE     14.00 IS CODE =  21
 ----------------------------------------------------------------------------
```

```
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
==============================================================================
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =    517.90
  DOWNSTREAM ELEVATION(FEET) =    517.20
  ELEVATION DIFFERENCE(FEET) =      0.70
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.702
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    63.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.125
  SUBAREA RUNOFF(CFS) =      0.22
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.22

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  517.20  DOWNSTREAM ELEVATION(FEET) =  515.40
  STREET LENGTH(FEET) =   145.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  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) =       0.46
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.20
    HALFSTREET FLOOD WIDTH(FEET) =    2.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.42
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.48
  STREET FLOW TRAVEL TIME(MIN.) =   1.00   Tc(MIN.) =    6.70
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.519
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  SUBAREA AREA(ACRES) =    0.13      SUBAREA RUNOFF(CFS) =    0.49
  TOTAL AREA(ACRES) =        0.2        PEAK FLOW RATE(CFS) =       0.69

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.23   HALFSTREET FLOOD WIDTH(FEET) =   4.03
  FLOW VELOCITY(FEET/SEC.) =  2.03   DEPTH*VELOCITY(FT*FT/SEC.) =   0.48
  LONGEST FLOWPATH FROM NODE      5.00 TO NODE     15.00 =     220.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 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) =   505.40  DOWNSTREAM(FEET) =   492.30
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.77
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.69
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =    6.77
  LONGEST FLOWPATH FROM NODE      5.00 TO NODE    103.00 =     270.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.77
  RAINFALL INTENSITY(INCH/HR) =   5.48
  TOTAL STREAM AREA(ACRES) =     0.18
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.69

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        3.74     8.57        4.709          1.81
      2        0.69     6.77        5.482          0.18

  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        3.90     6.77       5.482
      2        4.33     8.57       4.709

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       4.33   Tc(MIN.) =    8.57
  TOTAL AREA(ACRES) =        2.0
  LONGEST FLOWPATH FROM NODE      9.00 TO NODE    103.00 =     815.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =    516.50
  DOWNSTREAM ELEVATION(FEET) =    515.60
```

```
  ELEVATION DIFFERENCE(FEET) =      0.90
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.407
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    67.00
           (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) =      2.61
  TOTAL AREA(ACRES) =      0.58   TOTAL RUNOFF(CFS) =      2.61

****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE    200.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  515.60  DOWNSTREAM ELEVATION(FEET) =  511.00
  STREET LENGTH(FEET) =    86.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  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) =       2.94
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    7.16
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.51
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.31
  STREET FLOW TRAVEL TIME(MIN.) =   0.32   Tc(MIN.) =    5.73
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.108
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  SUBAREA AREA(ACRES) =    0.15      SUBAREA RUNOFF(CFS) =    0.65
  TOTAL AREA(ACRES) =        0.7        PEAK FLOW RATE(CFS) =       3.17

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =   7.47
  FLOW VELOCITY(FEET/SEC.) =  4.58   DEPTH*VELOCITY(FT*FT/SEC.) =   1.35
  LONGEST FLOWPATH FROM NODE     16.00 TO NODE    200.00 =     161.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   505.00  DOWNSTREAM(FEET) =   502.00
  FLOW LENGTH(FEET) =    53.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   6.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   9.70
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.17
```

```
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    5.82
  LONGEST FLOWPATH FROM NODE     16.00 TO NODE    201.00 =     214.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    201.00 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.) =    5.82
  RAINFALL INTENSITY(INCH/HR) =   6.05
  TOTAL STREAM AREA(ACRES) =     0.73
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.17

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =    516.30
  DOWNSTREAM ELEVATION(FEET) =    515.50
  ELEVATION DIFFERENCE(FEET) =      0.80
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.568
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    65.67
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.219
  SUBAREA RUNOFF(CFS) =      0.19
  TOTAL AREA(ACRES) =      0.04   TOTAL RUNOFF(CFS) =      0.19

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE    201.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  515.50  DOWNSTREAM ELEVATION(FEET) =  508.00
  STREET LENGTH(FEET) =   115.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  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) =       0.39
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.20
    HALFSTREET FLOOD WIDTH(FEET) =    2.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.54
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.10
```

```
  STREET FLOW TRAVEL TIME(MIN.) =   0.35   Tc(MIN.) =    5.91
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.982
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  SUBAREA AREA(ACRES) =    0.09      SUBAREA RUNOFF(CFS) =    0.38
  TOTAL AREA(ACRES) =        0.1        PEAK FLOW RATE(CFS) =       0.57

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.20   HALFSTREET FLOOD WIDTH(FEET) =   2.00
  FLOW VELOCITY(FEET/SEC.) =  5.54   DEPTH*VELOCITY(FT*FT/SEC.) =   1.10
  LONGEST FLOWPATH FROM NODE     18.00 TO NODE    201.00 =     190.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    201.00 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.) =    5.91
  RAINFALL INTENSITY(INCH/HR) =   5.98
  TOTAL STREAM AREA(ACRES) =     0.13
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.57

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        3.17     5.82        6.046          0.73
      2        0.57     5.91        5.982          0.13

  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        3.73     5.82       6.046
      2        3.70     5.91       5.982

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       3.73   Tc(MIN.) =    5.82
  TOTAL AREA(ACRES) =        0.9
  LONGEST FLOWPATH FROM NODE     16.00 TO NODE    201.00 =     214.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   502.00  DOWNSTREAM(FEET) =   496.00
  FLOW LENGTH(FEET) =    37.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  15.21
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.73
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    5.86
  LONGEST FLOWPATH FROM NODE     16.00 TO NODE    202.00 =     251.00 FEET.
```

```
****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    510.60
  DOWNSTREAM ELEVATION(FEET) =    510.40
  ELEVATION DIFFERENCE(FEET) =      0.20
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.254
  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) =  5.770
  SUBAREA RUNOFF(CFS) =      0.12
  TOTAL AREA(ACRES) =      0.03   TOTAL RUNOFF(CFS) =      0.12

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE    105.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  510.40  DOWNSTREAM ELEVATION(FEET) =  508.70
  STREET LENGTH(FEET) =    71.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  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) =       0.40
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.20
    HALFSTREET FLOOD WIDTH(FEET) =    2.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.36
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.67
  STREET FLOW TRAVEL TIME(MIN.) =   0.35   Tc(MIN.) =    6.61
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.570
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  SUBAREA AREA(ACRES) =    0.14      SUBAREA RUNOFF(CFS) =    0.55
  TOTAL AREA(ACRES) =        0.2        PEAK FLOW RATE(CFS) =       0.67
```

```
  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.20   HALFSTREET FLOOD WIDTH(FEET) =   2.00
  FLOW VELOCITY(FEET/SEC.) =  3.36   DEPTH*VELOCITY(FT*FT/SEC.) =   0.67
  LONGEST FLOWPATH FROM NODE     22.00 TO NODE    105.00 =     131.00 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.) =    6.61
  RAINFALL INTENSITY(INCH/HR) =   5.57
  TOTAL STREAM AREA(ACRES) =     0.17
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.67

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE    106.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    39.00
  UPSTREAM ELEVATION(FEET) =    510.30
  DOWNSTREAM ELEVATION(FEET) =    506.40
  ELEVATION DIFFERENCE(FEET) =      3.90
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.035
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.666
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.14
  TOTAL AREA(ACRES) =      0.03   TOTAL RUNOFF(CFS) =      0.14

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 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) =   503.90  DOWNSTREAM(FEET) =   503.30
  FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   1.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.04
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.14
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =    2.20
  LONGEST FLOWPATH FROM NODE     24.00 TO NODE    105.00 =      69.00 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.) =    2.20
  RAINFALL INTENSITY(INCH/HR) =   6.67
```

```
  TOTAL STREAM AREA(ACRES) =     0.03
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.14

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        0.67     6.61        5.570          0.17
      2        0.14     2.20        6.666          0.03

  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        0.37     2.20       6.666
      2        0.79     6.61       5.570

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       0.79   Tc(MIN.) =    6.61
  TOTAL AREA(ACRES) =        0.2
  LONGEST FLOWPATH FROM NODE     22.00 TO NODE    105.00 =     131.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    202.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   503.30  DOWNSTREAM(FEET) =   503.00
  FLOW LENGTH(FEET) =    16.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   3.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.58
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.79
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    6.66
  LONGEST FLOWPATH FROM NODE     22.00 TO NODE    202.00 =     147.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.66
  RAINFALL INTENSITY(INCH/HR) =   5.54
  TOTAL STREAM AREA(ACRES) =     0.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.79

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    514.00
  DOWNSTREAM ELEVATION(FEET) =    513.00
```

```
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.586
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.666
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.11
  TOTAL AREA(ACRES) =      0.02   TOTAL RUNOFF(CFS) =      0.11

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE    202.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  513.00  DOWNSTREAM ELEVATION(FEET) =  503.00
  STREET LENGTH(FEET) =    92.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  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) =       0.46
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.20
    HALFSTREET FLOOD WIDTH(FEET) =    2.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.16
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.42
  STREET FLOW TRAVEL TIME(MIN.) =   0.21   Tc(MIN.) =    4.80
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.666
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  SUBAREA AREA(ACRES) =    0.15      SUBAREA RUNOFF(CFS) =    0.69
  TOTAL AREA(ACRES) =        0.2        PEAK FLOW RATE(CFS) =       0.80

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.20   HALFSTREET FLOOD WIDTH(FEET) =   2.00
  FLOW VELOCITY(FEET/SEC.) =  7.16   DEPTH*VELOCITY(FT*FT/SEC.) =   1.42
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE    202.00 =     152.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 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.) =    4.80
  RAINFALL INTENSITY(INCH/HR) =   6.67
  TOTAL STREAM AREA(ACRES) =     0.17
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.80

  ** CONFLUENCE DATA **
```

```
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        0.79     6.66        5.538          0.20
      2        0.80     4.80        6.666          0.17

  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        1.46     4.80       6.666
      2        1.46     6.66       5.538

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       1.46   Tc(MIN.) =    4.80
  TOTAL AREA(ACRES) =        0.4
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE    202.00 =     152.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 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        1.46     4.80       6.666        0.37
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE    202.00 =     152.00 FEET.

  ** MEMORY BANK #  3 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        3.73     5.86       6.019        0.86
  LONGEST FLOWPATH FROM NODE     16.00 TO NODE    202.00 =     251.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1       4.52       4.80       6.666
      2       5.05       5.86       6.019

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.05   Tc(MIN.) =    5.86
  TOTAL AREA(ACRES) =        1.2

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 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) =   496.00  DOWNSTREAM(FEET) =   495.50
  FLOW LENGTH(FEET) =     7.00   MANNING'S N =  0.013
```

```
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  12.06
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.05
  PIPE TRAVEL TIME(MIN.) =   0.01    Tc(MIN.) =    5.87
  LONGEST FLOWPATH FROM NODE     16.00 TO NODE    104.00 =     258.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 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.) =    5.87
  RAINFALL INTENSITY(INCH/HR) =   6.01
  TOTAL STREAM AREA(ACRES) =     1.23
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.05

****************************************************************************
  FLOW PROCESS FROM NODE     25.00 TO NODE     26.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    538.00
  DOWNSTREAM ELEVATION(FEET) =    530.00
  ELEVATION DIFFERENCE(FEET) =      8.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.475
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    98.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.666
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.24
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.24

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE    104.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    530.00  DOWNSTREAM(FEET) =    519.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    93.00   CHANNEL SLOPE =  0.1183
  CHANNEL BASE(FEET) =    4.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.666
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.43
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.14
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   0.49
  Tc(MIN.) =    3.97
  SUBAREA AREA(ACRES) =     0.08       SUBAREA RUNOFF(CFS) =    0.38
```

```
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  TOTAL AREA(ACRES) =        0.1         PEAK FLOW RATE(CFS) =       0.62

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   3.68
  LONGEST FLOWPATH FROM NODE     25.00 TO NODE    104.00 =     193.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 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.) =    3.97
  RAINFALL INTENSITY(INCH/HR) =   6.67
  TOTAL STREAM AREA(ACRES) =     0.13
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.62

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        5.05     5.87        6.013          1.23
      2        0.62     3.97        6.666          0.13

  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        4.03     3.97       6.666
      2        5.60     5.87       6.013

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.60   Tc(MIN.) =    5.87
  TOTAL AREA(ACRES) =        1.4
  LONGEST FLOWPATH FROM NODE     16.00 TO NODE    104.00 =     258.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 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) =   495.50  DOWNSTREAM(FEET) =   494.10
  FLOW LENGTH(FEET) =   139.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  11.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.81
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.60
  PIPE TRAVEL TIME(MIN.) =   0.40    Tc(MIN.) =    6.26
  LONGEST FLOWPATH FROM NODE     16.00 TO NODE    107.00 =     397.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    107.00 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) =   494.10  DOWNSTREAM(FEET) =   492.30
  FLOW LENGTH(FEET) =   179.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  11.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.81
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.60
  PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =    6.78
  LONGEST FLOWPATH FROM NODE     16.00 TO NODE    103.00 =     576.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 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        5.60     6.78       5.478        1.36
  LONGEST FLOWPATH FROM NODE     16.00 TO NODE    103.00 =     576.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        4.33     8.57       4.709        1.99
  LONGEST FLOWPATH FROM NODE      9.00 TO NODE    103.00 =     815.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1       9.03       6.78        5.478
      2       9.14       8.57        4.709

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       9.14   Tc(MIN.) =    8.57
  TOTAL AREA(ACRES) =        3.3

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 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) =   492.30  DOWNSTREAM(FEET) =   491.40
  FLOW LENGTH(FEET) =    85.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  18.0 INCH PIPE IS  13.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.71
  ESTIMATED PIPE DIAMETER(INCH) =  18.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       9.14
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =    8.78
  LONGEST FLOWPATH FROM NODE      9.00 TO NODE    108.00 =     900.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE     27.00 IS CODE =  51
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
================================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    491.40  DOWNSTREAM(FEET) =    491.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    53.00   CHANNEL SLOPE =  0.0075
  CHANNEL BASE(FEET) =    4.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.516
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       9.24
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.42
  AVERAGE FLOW DEPTH(FEET) =   0.70   TRAVEL TIME(MIN.) =   0.36
  Tc(MIN.) =    9.14
  SUBAREA AREA(ACRES) =     0.06       SUBAREA RUNOFF(CFS) =    0.19
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.560
  TOTAL AREA(ACRES) =        3.4         PEAK FLOW RATE(CFS) =       9.14

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.70   FLOW VELOCITY(FEET/SEC.) =   2.42
  LONGEST FLOWPATH FROM NODE      9.00 TO NODE     27.00 =     953.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 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.) =    9.14
  RAINFALL INTENSITY(INCH/HR) =   4.52
  TOTAL STREAM AREA(ACRES) =     3.41
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      9.14

****************************************************************************
  FLOW PROCESS FROM NODE     28.00 TO NODE     27.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   150.00
  UPSTREAM ELEVATION(FEET) =    501.20
  DOWNSTREAM ELEVATION(FEET) =    491.00
  ELEVATION DIFFERENCE(FEET) =     10.20
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.646
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    96.80
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.666
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.14
  TOTAL AREA(ACRES) =      0.03   TOTAL RUNOFF(CFS) =      0.14

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 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.) =    3.65
  RAINFALL INTENSITY(INCH/HR) =   6.67
  TOTAL STREAM AREA(ACRES) =     0.03
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.14

****************************************************************************
  FLOW PROCESS FROM NODE     29.00 TO NODE     27.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6600
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  77
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   148.00
  UPSTREAM ELEVATION(FEET) =    498.00
  DOWNSTREAM ELEVATION(FEET) =    491.00
  ELEVATION DIFFERENCE(FEET) =      7.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.583
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    94.32
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.666
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.62
  TOTAL AREA(ACRES) =      0.14   TOTAL RUNOFF(CFS) =      0.62

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 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.) =    4.58
  RAINFALL INTENSITY(INCH/HR) =   6.67
  TOTAL STREAM AREA(ACRES) =     0.14
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.62

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     27.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6600
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  77
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    93.00
  UPSTREAM ELEVATION(FEET) =    494.00
  DOWNSTREAM ELEVATION(FEET) =    491.00
  ELEVATION DIFFERENCE(FEET) =      3.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.101
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    90.56
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.580
  SUBAREA RUNOFF(CFS) =      0.30
```

```
  TOTAL AREA(ACRES) =      0.07   TOTAL RUNOFF(CFS) =      0.30

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 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.) =    5.10
  RAINFALL INTENSITY(INCH/HR) =   6.58
  TOTAL STREAM AREA(ACRES) =     0.07
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.30

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        9.14     9.14        4.516          3.41
      2        0.14     3.65        6.666          0.03
      3        0.62     4.58        6.666          0.14
      4        0.30     5.10        6.580          0.07

  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        4.49     3.65       6.666
      2        5.61     4.58       6.666
      3        6.15     5.10       6.580
      4        9.87     9.14       4.516

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       9.87   Tc(MIN.) =    9.14
  TOTAL AREA(ACRES) =        3.6
  LONGEST FLOWPATH FROM NODE      9.00 TO NODE     27.00 =     953.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     31.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  491.00  DOWNSTREAM ELEVATION(FEET) =  439.00
  STREET LENGTH(FEET) =   609.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  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) =      13.44
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.34
```

```
    HALFSTREET FLOOD WIDTH(FEET) =    9.84
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    6.34
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.15
  STREET FLOW TRAVEL TIME(MIN.) =   1.60   Tc(MIN.) =   10.74
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.070
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6600
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  77
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.606
  SUBAREA AREA(ACRES) =    2.66      SUBAREA RUNOFF(CFS) =    7.14
  TOTAL AREA(ACRES) =        6.3        PEAK FLOW RATE(CFS) =      15.57

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.35   HALFSTREET FLOOD WIDTH(FEET) =  10.51
  FLOW VELOCITY(FEET/SEC.) =  6.60   DEPTH*VELOCITY(FT*FT/SEC.) =   2.31
  LONGEST FLOWPATH FROM NODE      9.00 TO NODE     31.00 =    1562.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     31.00 TO NODE   1000.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  439.00  DOWNSTREAM ELEVATION(FEET) =  436.00
  STREET LENGTH(FEET) =   298.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  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) =      16.11
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.56
    HALFSTREET FLOOD WIDTH(FEET) =   22.46
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.43
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.93
  STREET FLOW TRAVEL TIME(MIN.) =   1.45   Tc(MIN.) =   12.19
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.751
  GENERAL COMMERCIAL RUNOFF COEFFICIENT = .8000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  89
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.617
  SUBAREA AREA(ACRES) =    0.36      SUBAREA RUNOFF(CFS) =    1.08
  TOTAL AREA(ACRES) =        6.7        PEAK FLOW RATE(CFS) =      15.57

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.56   HALFSTREET FLOOD WIDTH(FEET) =  22.15
  FLOW VELOCITY(FEET/SEC.) =  3.40   DEPTH*VELOCITY(FT*FT/SEC.) =   1.90
  LONGEST FLOWPATH FROM NODE      9.00 TO NODE   1000.00 =    1860.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1000.00 TO NODE   1000.00 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       15.57    12.19       3.751        6.67
  LONGEST FLOWPATH FROM NODE      9.00 TO NODE   1000.00 =    1860.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        9.72    11.32       3.936        4.38
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE   1000.00 =    1380.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      24.17      11.32        3.936
      2      24.83      12.19        3.751

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      24.83   Tc(MIN.) =   12.19
  TOTAL AREA(ACRES) =       11.1

****************************************************************************
  FLOW PROCESS FROM NODE   1000.00 TO NODE   1000.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     32.00 TO NODE     33.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   120.00
  UPSTREAM ELEVATION(FEET) =    508.60
  DOWNSTREAM ELEVATION(FEET) =    490.00
  ELEVATION DIFFERENCE(FEET) =     18.60
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.259
  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) =  6.666
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.10
  TOTAL AREA(ACRES) =      0.02   TOTAL RUNOFF(CFS) =      0.10

****************************************************************************
  FLOW PROCESS FROM NODE     33.00 TO NODE    300.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  490.00  DOWNSTREAM ELEVATION(FEET) =  445.00
  STREET LENGTH(FEET) =   542.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00
```

```
  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  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) =       1.45
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.21
    HALFSTREET FLOOD WIDTH(FEET) =    2.66
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.66
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.19
  STREET FLOW TRAVEL TIME(MIN.) =   1.60   Tc(MIN.) =    4.85
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.666
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  GENERAL COMMERCIAL RUNOFF COEFFICIENT = .8000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  89
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.796
  SUBAREA AREA(ACRES) =    0.51      SUBAREA RUNOFF(CFS) =    2.70
  TOTAL AREA(ACRES) =        0.5        PEAK FLOW RATE(CFS) =       2.80

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.27   HALFSTREET FLOOD WIDTH(FEET) =   6.03
  FLOW VELOCITY(FEET/SEC.) =  5.40   DEPTH*VELOCITY(FT*FT/SEC.) =   1.46
  LONGEST FLOWPATH FROM NODE     32.00 TO NODE    300.00 =     662.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    300.00 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.) =    4.85
  RAINFALL INTENSITY(INCH/HR) =   6.67
  TOTAL STREAM AREA(ACRES) =     0.53
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.80

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     35.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6600
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  77
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    480.00
  DOWNSTREAM ELEVATION(FEET) =    475.00
  ELEVATION DIFFERENCE(FEET) =      5.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.515
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    95.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.666
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
```

```
  SUBAREA RUNOFF(CFS) =      0.35
  TOTAL AREA(ACRES) =      0.08   TOTAL RUNOFF(CFS) =      0.35

****************************************************************************
  FLOW PROCESS FROM NODE     35.00 TO NODE    300.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  475.00  DOWNSTREAM ELEVATION(FEET) =  445.00
  STREET LENGTH(FEET) =   509.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  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) =       4.57
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    5.91
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.52
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.21
  STREET FLOW TRAVEL TIME(MIN.) =   1.88   Tc(MIN.) =    6.39
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.690
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6600
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  77
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.660
  SUBAREA AREA(ACRES) =    2.24      SUBAREA RUNOFF(CFS) =    8.41
  TOTAL AREA(ACRES) =        2.3        PEAK FLOW RATE(CFS) =       8.71

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.32   HALFSTREET FLOOD WIDTH(FEET) =   8.66
  FLOW VELOCITY(FEET/SEC.) =  5.05   DEPTH*VELOCITY(FT*FT/SEC.) =   1.60
  LONGEST FLOWPATH FROM NODE     34.00 TO NODE    300.00 =     609.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    300.00 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.) =    6.39
  RAINFALL INTENSITY(INCH/HR) =   5.69
  TOTAL STREAM AREA(ACRES) =     2.32
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.71

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    301.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   5.00   RAIN INTENSITY(INCH/HOUR) =  6.67
```

```
  TOTAL AREA(ACRES) =    50.27   TOTAL RUNOFF(CFS) =     45.86

****************************************************************************
  FLOW PROCESS FROM NODE    301.00 TO NODE    300.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   474.00  DOWNSTREAM(FEET) =   440.00
  FLOW LENGTH(FEET) =   552.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  13.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  19.66
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      45.86
  PIPE TRAVEL TIME(MIN.) =   0.47    Tc(MIN.) =    5.47
  LONGEST FLOWPATH FROM NODE     29.00 TO NODE    300.00 =     700.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE    300.00 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.) =    5.47
  RAINFALL INTENSITY(INCH/HR) =   6.29
  TOTAL STREAM AREA(ACRES) =    50.27
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     45.86

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        2.80     4.85        6.666          0.53
      2        8.71     6.39        5.690          2.32
      3       45.86     5.47        6.292         50.27

  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       50.14     4.85       6.666
      2       55.96     5.47       6.292
      3       52.58     6.39       5.690

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      55.96   Tc(MIN.) =    5.47
  TOTAL AREA(ACRES) =       53.1
  LONGEST FLOWPATH FROM NODE     29.00 TO NODE    300.00 =     700.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    300.00 TO NODE   2000.00 IS CODE =  41
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING USER-SPECIFIED PIPESIZE (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   440.00  DOWNSTREAM(FEET) =   433.00
  FLOW LENGTH(FEET) =   360.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  36.0 INCH PIPE IS  20.5 INCHES
```

```
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.49
  GIVEN PIPE DIAMETER(INCH) =  36.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =      55.96
  PIPE TRAVEL TIME(MIN.) =   0.44    Tc(MIN.) =    5.91
  LONGEST FLOWPATH FROM NODE     29.00 TO NODE   2000.00 =    1060.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2000.00 TO NODE   2000.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     34.00 TO NODE     36.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6600
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  77
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    480.00
  DOWNSTREAM ELEVATION(FEET) =    478.00
  ELEVATION DIFFERENCE(FEET) =      2.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.444
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    75.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.310
  SUBAREA RUNOFF(CFS) =      0.54
  TOTAL AREA(ACRES) =      0.13   TOTAL RUNOFF(CFS) =      0.54

****************************************************************************
  FLOW PROCESS FROM NODE     36.00 TO NODE     37.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  478.00  DOWNSTREAM ELEVATION(FEET) =  454.00
  STREET LENGTH(FEET) =   485.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  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) =       4.21
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.27
    HALFSTREET FLOOD WIDTH(FEET) =    5.97
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.11
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.11
  STREET FLOW TRAVEL TIME(MIN.) =   1.96   Tc(MIN.) =    7.41
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.173
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6600
```

```
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  77
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.660
  SUBAREA AREA(ACRES) =    2.14      SUBAREA RUNOFF(CFS) =    7.31
  TOTAL AREA(ACRES) =        2.3        PEAK FLOW RATE(CFS) =       7.75

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   8.53
  FLOW VELOCITY(FEET/SEC.) =  4.59   DEPTH*VELOCITY(FT*FT/SEC.) =   1.45
  LONGEST FLOWPATH FROM NODE     34.00 TO NODE     37.00 =     585.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     37.00 TO NODE     38.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  454.00  DOWNSTREAM ELEVATION(FEET) =  440.00
  STREET LENGTH(FEET) =   660.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  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) =       8.67
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.43
    HALFSTREET FLOOD WIDTH(FEET) =   15.04
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.92
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.69
  STREET FLOW TRAVEL TIME(MIN.) =   2.81   Tc(MIN.) =   10.22
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.205
  GENERAL COMMERCIAL RUNOFF COEFFICIENT = .8000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  89
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.687
  SUBAREA AREA(ACRES) =    0.55      SUBAREA RUNOFF(CFS) =    1.85
  TOTAL AREA(ACRES) =        2.8        PEAK FLOW RATE(CFS) =       8.15

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.42   HALFSTREET FLOOD WIDTH(FEET) =  14.65
  FLOW VELOCITY(FEET/SEC.) =  3.86   DEPTH*VELOCITY(FT*FT/SEC.) =   1.64
  LONGEST FLOWPATH FROM NODE     34.00 TO NODE     38.00 =    1245.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     38.00 TO NODE     38.00 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.) =   10.22
  RAINFALL INTENSITY(INCH/HR) =   4.20
  TOTAL STREAM AREA(ACRES) =     2.82
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      8.15
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     39.00 TO NODE     40.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6600
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  77
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    495.00
  DOWNSTREAM ELEVATION(FEET) =    478.00
  ELEVATION DIFFERENCE(FEET) =     17.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.676
  WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.666
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.53
  TOTAL AREA(ACRES) =      0.12   TOTAL RUNOFF(CFS) =      0.53

****************************************************************************
  FLOW PROCESS FROM NODE     40.00 TO NODE     38.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    478.00  DOWNSTREAM(FEET) =    440.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   543.00   CHANNEL SLOPE =  0.0700
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.713
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6600
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  77
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       6.57
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.38
  AVERAGE FLOW DEPTH(FEET) =   0.18   TRAVEL TIME(MIN.) =   2.67
  Tc(MIN.) =    6.35
  SUBAREA AREA(ACRES) =     3.17       SUBAREA RUNOFF(CFS) =   11.95
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.660
  TOTAL AREA(ACRES) =        3.3         PEAK FLOW RATE(CFS) =      12.41

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.26   FLOW VELOCITY(FEET/SEC.) =   4.29
  LONGEST FLOWPATH FROM NODE     39.00 TO NODE     38.00 =     643.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     38.00 TO NODE     38.00 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.) =    6.35
  RAINFALL INTENSITY(INCH/HR) =   5.71
  TOTAL STREAM AREA(ACRES) =     3.29
  PEAK FLOW RATE(CFS) AT CONFLUENCE =     12.41

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
```

```
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        8.15    10.22        4.205          2.82
      2       12.41     6.35        5.713          3.29

  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       17.47     6.35       5.713
      2       17.28    10.22       4.205

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      17.47   Tc(MIN.) =    6.35
  TOTAL AREA(ACRES) =        6.1
  LONGEST FLOWPATH FROM NODE     34.00 TO NODE     38.00 =    1245.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     38.00 TO NODE   2000.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  440.00  DOWNSTREAM ELEVATION(FEET) =  438.00
  STREET LENGTH(FEET) =   128.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  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) =      17.67
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.54
    HALFSTREET FLOOD WIDTH(FEET) =   21.29
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.17
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    2.26
  STREET FLOW TRAVEL TIME(MIN.) =   0.51   Tc(MIN.) =    6.86
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.434
  GENERAL COMMERCIAL RUNOFF COEFFICIENT = .8000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  89
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.674
  SUBAREA AREA(ACRES) =    0.09      SUBAREA RUNOFF(CFS) =    0.39
  TOTAL AREA(ACRES) =        6.2        PEAK FLOW RATE(CFS) =      22.72

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.58   HALFSTREET FLOOD WIDTH(FEET) =  23.55
  FLOW VELOCITY(FEET/SEC.) =  4.41   DEPTH*VELOCITY(FT*FT/SEC.) =   2.57
  LONGEST FLOWPATH FROM NODE     34.00 TO NODE   2000.00 =    1373.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   2000.00 TO NODE   2000.00 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       22.72     6.86       5.434        6.20
  LONGEST FLOWPATH FROM NODE     34.00 TO NODE   2000.00 =    1373.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1       55.96     5.91       5.983       53.12
  LONGEST FLOWPATH FROM NODE     29.00 TO NODE   2000.00 =    1060.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      75.54       5.91        5.983
      2      73.56       6.86        5.434

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      75.54   Tc(MIN.) =    5.91
  TOTAL AREA(ACRES) =       59.3

****************************************************************************
  FLOW PROCESS FROM NODE   2000.00 TO NODE   2000.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       59.3  TC(MIN.) =      5.91
  PEAK FLOW RATE(CFS)   =      75.54
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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CHAPTER 5 – 100 YEAR HYDROLOGIC ANALYSIS FOR MITIGATED CONDITIONS

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**************************************************************************

            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 1643

                              Analysis prepared by:

                                   REC CONSULTANTS, INC.
                                        2442 2ND AVE
                                    SAN DIEGO, CA 92101

 ************************* DESCRIPTION OF STUDY *************************
* PROPOSED CONDITIONS HYDROLOGY - MITIGATED                             *
* 100-YEAR STORM                                                        *
* LANTERN CREST RIDGE ADDITION                                          *
 ************************************************************************

  FILE NAME: 1384PSTM.DAT
  TIME/DATE OF STUDY: 10:08 04/01/2019
------------------------------------------------------------------------
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
------------------------------------------------------------------------
  2003 SAN DIEGO MANUAL CRITERIA

  USER SPECIFIED STORM EVENT(YEAR) = 100.00
  6-HOUR DURATION PRECIPITATION (INCHES) =   2.530
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
  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   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0312 0.167 0.0150

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

+----------------------------------------------------------------------+
| NODE 1000 CORRESPONDS TO POC-1                                       |
| 100 SERIES NODES REPRESENT PROPOSED STORM DRAIN                      |
| 200 SERIES NODES REPRESENT THE PROPOSED BASIN                        |
+----------------------------------------------------------------------+

**************************************************************************
  FLOW PROCESS FROM NODE      1.00 TO NODE      2.00 IS CODE =  21
------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
```

```
 ============================================================================
   NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
   SOIL CLASSIFICATION IS "D"
   S.C.S. CURVE NUMBER (AMC II) =  88
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
   UPSTREAM ELEVATION(FEET) =    710.00
   DOWNSTREAM ELEVATION(FEET) =    695.00
   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) =  5.762
   SUBAREA RUNOFF(CFS) =      0.20
   TOTAL AREA(ACRES) =      0.10   TOTAL RUNOFF(CFS) =      0.20

 ****************************************************************************
   FLOW PROCESS FROM NODE      2.00 TO NODE      3.00 IS CODE =  51
 ----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    695.00  DOWNSTREAM(FEET) =    525.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   433.00   CHANNEL SLOPE =  0.3926
   CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   5.000
   MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   2.00
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.589
   NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
   SOIL CLASSIFICATION IS "D"
   S.C.S. CURVE NUMBER (AMC II) =  88
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.98
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.72
   AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =   2.65
   Tc(MIN.) =    8.92
   SUBAREA AREA(ACRES) =     0.96       SUBAREA RUNOFF(CFS) =    1.54
   AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
   TOTAL AREA(ACRES) =        1.1         PEAK FLOW RATE(CFS) =       1.70

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.05   FLOW VELOCITY(FEET/SEC.) =   3.42
   LONGEST FLOWPATH FROM NODE      1.00 TO NODE      3.00 =     533.00 FEET.

 ****************************************************************************
   FLOW PROCESS FROM NODE      3.00 TO NODE      4.00 IS CODE =  51
 ----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    525.00  DOWNSTREAM(FEET) =    500.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   125.00   CHANNEL SLOPE =  0.2000
   CHANNEL BASE(FEET) =    4.00   "Z" FACTOR =   2.000
   MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.496
   NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
   SOIL CLASSIFICATION IS "D"
   S.C.S. CURVE NUMBER (AMC II) =  88
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.97
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   7.25
   AVERAGE FLOW DEPTH(FEET) =   0.07   TRAVEL TIME(MIN.) =   0.29
   Tc(MIN.) =    9.21
   SUBAREA AREA(ACRES) =     0.34       SUBAREA RUNOFF(CFS) =    0.54
   AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
   TOTAL AREA(ACRES) =        1.4         PEAK FLOW RATE(CFS) =       2.20
```

```
  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.07   FLOW VELOCITY(FEET/SEC.) =   7.43
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     658.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 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.) =    9.21
  RAINFALL INTENSITY(INCH/HR) =   4.50
  TOTAL STREAM AREA(ACRES) =     1.40
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.20

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE      6.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =    517.90
  DOWNSTREAM ELEVATION(FEET) =    516.60
  ELEVATION DIFFERENCE(FEET) =      1.30
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.970
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    72.33
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.666
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.28
  TOTAL AREA(ACRES) =      0.06   TOTAL RUNOFF(CFS) =      0.28

****************************************************************************
  FLOW PROCESS FROM NODE      6.00 TO NODE      7.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  516.60  DOWNSTREAM ELEVATION(FEET) =  515.90
  STREET LENGTH(FEET) =   121.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  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) =       0.65
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.26
    HALFSTREET FLOOD WIDTH(FEET) =    5.47
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    1.40
```

```
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.37
  STREET FLOW TRAVEL TIME(MIN.) =   1.44   Tc(MIN.) =    6.41
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.681
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  SUBAREA AREA(ACRES) =    0.18      SUBAREA RUNOFF(CFS) =    0.73
  TOTAL AREA(ACRES) =        0.2        PEAK FLOW RATE(CFS) =       0.97

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.29   HALFSTREET FLOOD WIDTH(FEET) =   7.16
  FLOW VELOCITY(FEET/SEC.) =  1.49   DEPTH*VELOCITY(FT*FT/SEC.) =   0.43
  LONGEST FLOWPATH FROM NODE      5.00 TO NODE      7.00 =     196.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      7.00 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) =   505.90  DOWNSTREAM(FEET) =   500.00
  FLOW LENGTH(FEET) =    61.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   3.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   8.92
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.97
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    6.52
  LONGEST FLOWPATH FROM NODE      5.00 TO NODE      4.00 =     257.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 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.) =    6.52
  RAINFALL INTENSITY(INCH/HR) =   5.62
  TOTAL STREAM AREA(ACRES) =     0.24
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.97

****************************************************************************
  FLOW PROCESS FROM NODE      8.00 TO NODE      4.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6600
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  77
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   117.00
  UPSTREAM ELEVATION(FEET) =    509.00
  DOWNSTREAM ELEVATION(FEET) =    500.00
  ELEVATION DIFFERENCE(FEET) =      9.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.966
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    97.69
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.666
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.53
```

```
  TOTAL AREA(ACRES) =      0.12   TOTAL RUNOFF(CFS) =      0.53

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE      4.00 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.) =    3.97
  RAINFALL INTENSITY(INCH/HR) =   6.67
  TOTAL STREAM AREA(ACRES) =     0.12
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.53

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        2.20     9.21        4.496          1.40
      2        0.97     6.52        5.617          0.24
      3        0.53     3.97        6.666          0.12

  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        2.07     3.97       6.666
      2        2.97     6.52       5.617
      3        3.33     9.21       4.496

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       3.33   Tc(MIN.) =    9.21
  TOTAL AREA(ACRES) =        1.8
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE      4.00 =     658.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE      4.00 TO NODE   1000.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  500.00  DOWNSTREAM ELEVATION(FEET) =  436.00
  STREET LENGTH(FEET) =   722.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  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) =       6.72
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.28
    HALFSTREET FLOOD WIDTH(FEET) =    6.66
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.70
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.61
```

```
  STREET FLOW TRAVEL TIME(MIN.) =   2.11   Tc(MIN.) =   11.32
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.936
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6600
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  77
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.564
  SUBAREA AREA(ACRES) =    2.62      SUBAREA RUNOFF(CFS) =    6.81
  TOTAL AREA(ACRES) =        4.4        PEAK FLOW RATE(CFS) =       9.72

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.31   HALFSTREET FLOOD WIDTH(FEET) =   8.22
  FLOW VELOCITY(FEET/SEC.) =  6.10   DEPTH*VELOCITY(FT*FT/SEC.) =   1.89
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE   1000.00 =    1380.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE   1000.00 TO NODE   1000.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 1 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE      9.00 TO NODE     10.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    710.00
  DOWNSTREAM ELEVATION(FEET) =    686.00
  ELEVATION DIFFERENCE(FEET) =     24.00
  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) =  5.762
  SUBAREA RUNOFF(CFS) =      0.10
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.10

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    686.00  DOWNSTREAM(FEET) =    554.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =   331.00   CHANNEL SLOPE =  0.3988
  CHANNEL BASE(FEET) =   10.00   "Z" FACTOR =   5.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.901
  NATURAL DESERT LANDSCAPING RUNOFF COEFFICIENT = .3500
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  88
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       1.29
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.08
  AVERAGE FLOW DEPTH(FEET) =   0.04   TRAVEL TIME(MIN.) =   1.79
  Tc(MIN.) =    8.06
  SUBAREA AREA(ACRES) =     1.37       SUBAREA RUNOFF(CFS) =    2.35
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.350
  TOTAL AREA(ACRES) =        1.4         PEAK FLOW RATE(CFS) =       2.44

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.06   FLOW VELOCITY(FEET/SEC.) =   4.07
```

```
  LONGEST FLOWPATH FROM NODE      9.00 TO NODE     11.00 =     431.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE    100.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    554.00  DOWNSTREAM(FEET) =    552.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    33.00   CHANNEL SLOPE =  0.0606
  CHANNEL BASE(FEET) =    4.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.861
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       2.47
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   5.34
  AVERAGE FLOW DEPTH(FEET) =   0.11   TRAVEL TIME(MIN.) =   0.10
  Tc(MIN.) =    8.16
  SUBAREA AREA(ACRES) =     0.02       SUBAREA RUNOFF(CFS) =    0.07
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.355
  TOTAL AREA(ACRES) =        1.4         PEAK FLOW RATE(CFS) =       2.48

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.11   FLOW VELOCITY(FEET/SEC.) =   5.37
  LONGEST FLOWPATH FROM NODE      9.00 TO NODE    100.00 =     464.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    100.00 TO NODE    101.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   548.50  DOWNSTREAM(FEET) =   525.80
  FLOW LENGTH(FEET) =   128.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   3.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.19
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.48
  PIPE TRAVEL TIME(MIN.) =   0.15    Tc(MIN.) =    8.31
  LONGEST FLOWPATH FROM NODE      9.00 TO NODE    101.00 =     592.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    101.00 TO NODE    102.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   525.80  DOWNSTREAM(FEET) =   513.90
  FLOW LENGTH(FEET) =    79.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   3.9 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  13.36
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.48
  PIPE TRAVEL TIME(MIN.) =   0.10    Tc(MIN.) =    8.41
  LONGEST FLOWPATH FROM NODE      9.00 TO NODE    102.00 =     671.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 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.) =    8.41
   RAINFALL INTENSITY(INCH/HR) =   4.77
   TOTAL STREAM AREA(ACRES) =     1.44
   PEAK FLOW RATE(CFS) AT CONFLUENCE =      2.48

 ****************************************************************************
   FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  21
 ----------------------------------------------------------------------------
   >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 ============================================================================
   URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .7100
   SOIL CLASSIFICATION IS "D"
   S.C.S. CURVE NUMBER (AMC II) =  94
   INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
   UPSTREAM ELEVATION(FEET) =    565.00
   DOWNSTREAM ELEVATION(FEET) =    533.00
   ELEVATION DIFFERENCE(FEET) =     32.00
   SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.259
   WARNING: THE MAXIMUM OVERLAND FLOW SLOPE, 10.%, IS USED IN Tc CALCULATION!
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.666
   NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
   SUBAREA RUNOFF(CFS) =      0.33
   TOTAL AREA(ACRES) =      0.07   TOTAL RUNOFF(CFS) =      0.33

 ****************************************************************************
   FLOW PROCESS FROM NODE     13.00 TO NODE    102.00 IS CODE =  51
 ----------------------------------------------------------------------------
   >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
   >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
 ============================================================================
   ELEVATION DATA: UPSTREAM(FEET) =    533.00  DOWNSTREAM(FEET) =    532.00
   CHANNEL LENGTH THRU SUBAREA(FEET) =   280.00   CHANNEL SLOPE =  0.0036
   CHANNEL BASE(FEET) =    4.00   "Z" FACTOR =   2.000
   MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
    100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.778
   URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .7100
   SOIL CLASSIFICATION IS "D"
   S.C.S. CURVE NUMBER (AMC II) =  94
   TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.95
   TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   1.57
   AVERAGE FLOW DEPTH(FEET) =   0.14   TRAVEL TIME(MIN.) =   2.98
   Tc(MIN.) =    6.24
   SUBAREA AREA(ACRES) =     0.30       SUBAREA RUNOFF(CFS) =    1.23
   AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
   TOTAL AREA(ACRES) =        0.4         PEAK FLOW RATE(CFS) =       1.52

   END OF SUBAREA CHANNEL FLOW HYDRAULICS:
   DEPTH(FEET) =  0.19   FLOW VELOCITY(FEET/SEC.) =   1.85
   LONGEST FLOWPATH FROM NODE     12.00 TO NODE    102.00 =     380.00 FEET.

 ****************************************************************************
   FLOW PROCESS FROM NODE    102.00 TO NODE    102.00 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.) =    6.24
```

```
  RAINFALL INTENSITY(INCH/HR) =   5.78
  TOTAL STREAM AREA(ACRES) =     0.37
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      1.52

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        2.48     8.41        4.768          1.44
      2        1.52     6.24        5.778          0.37

  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        3.36     6.24       5.778
      2        3.74     8.41       4.768

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       3.74   Tc(MIN.) =    8.41
  TOTAL AREA(ACRES) =        1.8
  LONGEST FLOWPATH FROM NODE      9.00 TO NODE    102.00 =     671.00 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) =   513.90  DOWNSTREAM(FEET) =   492.30
  FLOW LENGTH(FEET) =   144.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  14.78
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       3.74
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =    8.57
  LONGEST FLOWPATH FROM NODE      9.00 TO NODE    103.00 =     815.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 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.) =    8.57
  RAINFALL INTENSITY(INCH/HR) =   4.71
  TOTAL STREAM AREA(ACRES) =     1.81
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      3.74

****************************************************************************
  FLOW PROCESS FROM NODE      5.00 TO NODE     14.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =    517.90
  DOWNSTREAM ELEVATION(FEET) =    517.20
```

```
  ELEVATION DIFFERENCE(FEET) =      0.70
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.702
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    63.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.125
  SUBAREA RUNOFF(CFS) =      0.22
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.22

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  517.20  DOWNSTREAM ELEVATION(FEET) =  515.40
  STREET LENGTH(FEET) =   145.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  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) =       0.46
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.20
    HALFSTREET FLOOD WIDTH(FEET) =    2.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    2.42
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.48
  STREET FLOW TRAVEL TIME(MIN.) =   1.00   Tc(MIN.) =    6.70
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.519
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  SUBAREA AREA(ACRES) =    0.13      SUBAREA RUNOFF(CFS) =    0.49
  TOTAL AREA(ACRES) =        0.2        PEAK FLOW RATE(CFS) =       0.69

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.23   HALFSTREET FLOOD WIDTH(FEET) =   4.03
  FLOW VELOCITY(FEET/SEC.) =  2.03   DEPTH*VELOCITY(FT*FT/SEC.) =   0.48
  LONGEST FLOWPATH FROM NODE      5.00 TO NODE     15.00 =     220.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     15.00 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) =   505.40  DOWNSTREAM(FEET) =   492.30
  FLOW LENGTH(FEET) =    50.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =  11.77
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.69
  PIPE TRAVEL TIME(MIN.) =   0.07    Tc(MIN.) =    6.77
```

```
  LONGEST FLOWPATH FROM NODE      5.00 TO NODE    103.00 =     270.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.77
  RAINFALL INTENSITY(INCH/HR) =   5.48
  TOTAL STREAM AREA(ACRES) =     0.18
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.69

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        3.74     8.57        4.709          1.81
      2        0.69     6.77        5.482          0.18

  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        3.90     6.77       5.482
      2        4.33     8.57       4.709

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       4.33   Tc(MIN.) =    8.57
  TOTAL AREA(ACRES) =        2.0
  LONGEST FLOWPATH FROM NODE      9.00 TO NODE    103.00 =     815.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     16.00 TO NODE     17.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =    516.50
  DOWNSTREAM ELEVATION(FEET) =    515.60
  ELEVATION DIFFERENCE(FEET) =      0.90
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.407
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    67.00
           (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) =      2.61
  TOTAL AREA(ACRES) =      0.58   TOTAL RUNOFF(CFS) =      2.61
```

```
****************************************************************************
  FLOW PROCESS FROM NODE     17.00 TO NODE    200.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  515.60  DOWNSTREAM ELEVATION(FEET) =  511.00
  STREET LENGTH(FEET) =    86.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  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) =       2.94
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.29
    HALFSTREET FLOOD WIDTH(FEET) =    7.16
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    4.51
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.31
  STREET FLOW TRAVEL TIME(MIN.) =   0.32   Tc(MIN.) =    5.73
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.108
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  SUBAREA AREA(ACRES) =    0.15      SUBAREA RUNOFF(CFS) =    0.65
  TOTAL AREA(ACRES) =        0.7        PEAK FLOW RATE(CFS) =       3.17

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.30   HALFSTREET FLOOD WIDTH(FEET) =   7.47
  FLOW VELOCITY(FEET/SEC.) =  4.58   DEPTH*VELOCITY(FT*FT/SEC.) =   1.35
  LONGEST FLOWPATH FROM NODE     16.00 TO NODE    200.00 =     161.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    200.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   5.00   RAIN INTENSITY(INCH/HOUR) =  6.67
  TOTAL AREA(ACRES) =     0.73   TOTAL RUNOFF(CFS) =      0.13

****************************************************************************
  FLOW PROCESS FROM NODE    200.00 TO NODE    201.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   505.00  DOWNSTREAM(FEET) =   502.00
  FLOW LENGTH(FEET) =    53.00   MANNING'S N =  0.013
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO  6.000
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   1.3 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.30
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.13
  PIPE TRAVEL TIME(MIN.) =   0.21    Tc(MIN.) =    5.21
```

```
  LONGEST FLOWPATH FROM NODE     16.00 TO NODE    201.00 =     214.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    201.00 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.) =    5.21
  RAINFALL INTENSITY(INCH/HR) =   6.49
  TOTAL STREAM AREA(ACRES) =     0.73
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.13

****************************************************************************
  FLOW PROCESS FROM NODE     18.00 TO NODE     19.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    75.00
  UPSTREAM ELEVATION(FEET) =    516.30
  DOWNSTREAM ELEVATION(FEET) =    515.50
  ELEVATION DIFFERENCE(FEET) =      0.80
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.568
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    65.67
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.219
  SUBAREA RUNOFF(CFS) =      0.19
  TOTAL AREA(ACRES) =      0.04   TOTAL RUNOFF(CFS) =      0.19

****************************************************************************
  FLOW PROCESS FROM NODE     19.00 TO NODE    201.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  515.50  DOWNSTREAM ELEVATION(FEET) =  508.00
  STREET LENGTH(FEET) =   115.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  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) =       0.39
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.20
    HALFSTREET FLOOD WIDTH(FEET) =    2.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.54
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.10
  STREET FLOW TRAVEL TIME(MIN.) =   0.35   Tc(MIN.) =    5.91
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.982
```

```
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  SUBAREA AREA(ACRES) =    0.09      SUBAREA RUNOFF(CFS) =    0.38
  TOTAL AREA(ACRES) =        0.1        PEAK FLOW RATE(CFS) =       0.57

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.20   HALFSTREET FLOOD WIDTH(FEET) =   2.00
  FLOW VELOCITY(FEET/SEC.) =  5.54   DEPTH*VELOCITY(FT*FT/SEC.) =   1.10
  LONGEST FLOWPATH FROM NODE     18.00 TO NODE    201.00 =     190.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    201.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   5.00   RAIN INTENSITY(INCH/HOUR) =  6.67
  TOTAL AREA(ACRES) =     0.13   TOTAL RUNOFF(CFS) =      0.07

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    201.00 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.) =    5.00
  RAINFALL INTENSITY(INCH/HR) =   6.67
  TOTAL STREAM AREA(ACRES) =     0.13
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.07

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        0.13     5.21        6.495          0.73
      2        0.07     5.00        6.666          0.13

  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        0.19     5.00       6.666
      2        0.20     5.21       6.495

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       0.20   Tc(MIN.) =    5.21
  TOTAL AREA(ACRES) =        0.9
  LONGEST FLOWPATH FROM NODE     16.00 TO NODE    201.00 =     214.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    201.00 TO NODE    202.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   502.00  DOWNSTREAM(FEET) =   496.00
  FLOW LENGTH(FEET) =    37.00   MANNING'S N =  0.013
```

```
  ESTIMATED PIPE DIAMETER(INCH) INCREASED TO  6.000
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   1.2 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   6.89
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.20
  PIPE TRAVEL TIME(MIN.) =   0.09    Tc(MIN.) =    5.30
  LONGEST FLOWPATH FROM NODE     16.00 TO NODE    202.00 =     251.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  10
----------------------------------------------------------------------------
  >>>>>MAIN-STREAM MEMORY COPIED ONTO MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE     22.00 TO NODE     23.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    510.60
  DOWNSTREAM ELEVATION(FEET) =    510.40
  ELEVATION DIFFERENCE(FEET) =      0.20
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    6.254
  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) =  5.770
  SUBAREA RUNOFF(CFS) =      0.12
  TOTAL AREA(ACRES) =      0.03   TOTAL RUNOFF(CFS) =      0.12

****************************************************************************
  FLOW PROCESS FROM NODE     23.00 TO NODE    105.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  510.40  DOWNSTREAM ELEVATION(FEET) =  508.70
  STREET LENGTH(FEET) =    71.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  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) =       0.40
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.20
    HALFSTREET FLOOD WIDTH(FEET) =    2.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.36
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    0.67
  STREET FLOW TRAVEL TIME(MIN.) =   0.35   Tc(MIN.) =    6.61
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  5.570
```

```
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  SUBAREA AREA(ACRES) =    0.14      SUBAREA RUNOFF(CFS) =    0.55
  TOTAL AREA(ACRES) =        0.2        PEAK FLOW RATE(CFS) =       0.67

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.20   HALFSTREET FLOOD WIDTH(FEET) =   2.00
  FLOW VELOCITY(FEET/SEC.) =  3.36   DEPTH*VELOCITY(FT*FT/SEC.) =   0.67
  LONGEST FLOWPATH FROM NODE     22.00 TO NODE    105.00 =     131.00 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.) =    6.61
  RAINFALL INTENSITY(INCH/HR) =   5.57
  TOTAL STREAM AREA(ACRES) =     0.17
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.67

****************************************************************************
  FLOW PROCESS FROM NODE     24.00 TO NODE    106.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    39.00
  UPSTREAM ELEVATION(FEET) =    510.30
  DOWNSTREAM ELEVATION(FEET) =    506.40
  ELEVATION DIFFERENCE(FEET) =      3.90
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    2.035
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.666
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.14
  TOTAL AREA(ACRES) =      0.03   TOTAL RUNOFF(CFS) =      0.14

****************************************************************************
  FLOW PROCESS FROM NODE    106.00 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) =   503.90  DOWNSTREAM(FEET) =   503.30
  FLOW LENGTH(FEET) =    30.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   1.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.04
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.14
  PIPE TRAVEL TIME(MIN.) =   0.16    Tc(MIN.) =    2.20
  LONGEST FLOWPATH FROM NODE     24.00 TO NODE    105.00 =      69.00 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.) =    2.20
  RAINFALL INTENSITY(INCH/HR) =   6.67
  TOTAL STREAM AREA(ACRES) =     0.03
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.14

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        0.67     6.61        5.570          0.17
      2        0.14     2.20        6.666          0.03

  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        0.37     2.20       6.666
      2        0.79     6.61       5.570

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       0.79   Tc(MIN.) =    6.61
  TOTAL AREA(ACRES) =        0.2
  LONGEST FLOWPATH FROM NODE     22.00 TO NODE    105.00 =     131.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    105.00 TO NODE    202.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =   503.30  DOWNSTREAM(FEET) =   503.00
  FLOW LENGTH(FEET) =    16.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   3.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.58
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.79
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    6.66
  LONGEST FLOWPATH FROM NODE     22.00 TO NODE    202.00 =     147.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.66
  RAINFALL INTENSITY(INCH/HR) =   5.54
  TOTAL STREAM AREA(ACRES) =     0.20
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.79

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
```

```
  S.C.S. CURVE NUMBER (AMC II) =  92
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    60.00
  UPSTREAM ELEVATION(FEET) =    514.00
  DOWNSTREAM ELEVATION(FEET) =    513.00
  ELEVATION DIFFERENCE(FEET) =      1.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.586
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.666
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.11
  TOTAL AREA(ACRES) =      0.02   TOTAL RUNOFF(CFS) =      0.11

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE    202.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  513.00  DOWNSTREAM ELEVATION(FEET) =  503.00
  STREET LENGTH(FEET) =    92.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  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) =       0.46
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.20
    HALFSTREET FLOOD WIDTH(FEET) =    2.00
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    7.16
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.42
  STREET FLOW TRAVEL TIME(MIN.) =   0.21   Tc(MIN.) =    4.80
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.666
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  92
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  SUBAREA AREA(ACRES) =    0.15      SUBAREA RUNOFF(CFS) =    0.69
  TOTAL AREA(ACRES) =        0.2        PEAK FLOW RATE(CFS) =       0.80

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.20   HALFSTREET FLOOD WIDTH(FEET) =   2.00
  FLOW VELOCITY(FEET/SEC.) =  7.16   DEPTH*VELOCITY(FT*FT/SEC.) =   1.42
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE    202.00 =     152.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 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.) =    4.80
  RAINFALL INTENSITY(INCH/HR) =   6.67
  TOTAL STREAM AREA(ACRES) =     0.17
```

```
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.80

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        0.79     6.66        5.538          0.20
      2        0.80     4.80        6.666          0.17

  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        1.46     4.80       6.666
      2        1.46     6.66       5.538

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       1.46   Tc(MIN.) =    4.80
  TOTAL AREA(ACRES) =        0.4
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE    202.00 =     152.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =   7
----------------------------------------------------------------------------
  >>>>>USER SPECIFIED HYDROLOGY INFORMATION AT NODE<<<<<
============================================================================
  USER-SPECIFIED VALUES ARE AS FOLLOWS:
  TC(MIN) =   5.00   RAIN INTENSITY(INCH/HOUR) =  6.67
  TOTAL AREA(ACRES) =     0.37   TOTAL RUNOFF(CFS) =      0.07

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 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        0.07     5.00       6.666        0.37
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE    202.00 =     152.00 FEET.

  ** MEMORY BANK #  3 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        0.20     5.30       6.424        0.86
  LONGEST FLOWPATH FROM NODE     16.00 TO NODE    202.00 =     251.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1       0.26       5.00        6.666
      2       0.27       5.30        6.424

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       0.27   Tc(MIN.) =    5.30
  TOTAL AREA(ACRES) =        1.2

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 TO NODE    202.00 IS CODE =  12
----------------------------------------------------------------------------
```

```
  >>>>>CLEAR MEMORY BANK # 3 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    202.00 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) =   496.00  DOWNSTREAM(FEET) =   495.50
  FLOW LENGTH(FEET) =     7.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   1.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.68
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.27
  PIPE TRAVEL TIME(MIN.) =   0.02    Tc(MIN.) =    5.32
  LONGEST FLOWPATH FROM NODE     16.00 TO NODE    104.00 =     258.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 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.) =    5.32
  RAINFALL INTENSITY(INCH/HR) =   6.41
  TOTAL STREAM AREA(ACRES) =     1.23
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.27

****************************************************************************
  FLOW PROCESS FROM NODE     25.00 TO NODE     26.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   100.00
  UPSTREAM ELEVATION(FEET) =    538.00
  DOWNSTREAM ELEVATION(FEET) =    530.00
  ELEVATION DIFFERENCE(FEET) =      8.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.475
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    98.00
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.666
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.24
  TOTAL AREA(ACRES) =      0.05   TOTAL RUNOFF(CFS) =      0.24

****************************************************************************
  FLOW PROCESS FROM NODE     26.00 TO NODE    104.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    530.00  DOWNSTREAM(FEET) =    519.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    93.00   CHANNEL SLOPE =  0.1183
  CHANNEL BASE(FEET) =    4.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.015   MAXIMUM DEPTH(FEET) =   2.00
```

```
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.666
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       0.43
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   3.14
  AVERAGE FLOW DEPTH(FEET) =   0.03   TRAVEL TIME(MIN.) =   0.49
  Tc(MIN.) =    3.97
  SUBAREA AREA(ACRES) =     0.08       SUBAREA RUNOFF(CFS) =    0.38
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.710
  TOTAL AREA(ACRES) =        0.1         PEAK FLOW RATE(CFS) =       0.62

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.04   FLOW VELOCITY(FEET/SEC.) =   3.68
  LONGEST FLOWPATH FROM NODE     25.00 TO NODE    104.00 =     193.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 TO NODE    104.00 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.) =    3.97
  RAINFALL INTENSITY(INCH/HR) =   6.67
  TOTAL STREAM AREA(ACRES) =     0.13
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.62

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        0.27     5.32        6.408          1.23
      2        0.62     3.97        6.666          0.13

  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        0.81     3.97       6.666
      2        0.86     5.32       6.408

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       0.86   Tc(MIN.) =    5.32
  TOTAL AREA(ACRES) =        1.4
  LONGEST FLOWPATH FROM NODE     16.00 TO NODE    104.00 =     258.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    104.00 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) =   495.50  DOWNSTREAM(FEET) =   494.10
  FLOW LENGTH(FEET) =   139.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.72
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.86
```

```
  PIPE TRAVEL TIME(MIN.) =   0.62    Tc(MIN.) =    5.94
  LONGEST FLOWPATH FROM NODE     16.00 TO NODE    107.00 =     397.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    107.00 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) =   494.10  DOWNSTREAM(FEET) =   492.30
  FLOW LENGTH(FEET) =   179.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   4.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.72
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.86
  PIPE TRAVEL TIME(MIN.) =   0.80    Tc(MIN.) =    6.74
  LONGEST FLOWPATH FROM NODE     16.00 TO NODE    103.00 =     576.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 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        0.86     6.74       5.497        1.36
  LONGEST FLOWPATH FROM NODE     16.00 TO NODE    103.00 =     576.00 FEET.

  ** MEMORY BANK #  2 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        4.33     8.57       4.709        1.99
  LONGEST FLOWPATH FROM NODE      9.00 TO NODE    103.00 =     815.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1       4.26       6.74        5.497
      2       5.06       8.57        4.709

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.06   Tc(MIN.) =    8.57
  TOTAL AREA(ACRES) =        3.3

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 TO NODE    103.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 2 <<<<<
============================================================================

****************************************************************************
  FLOW PROCESS FROM NODE    103.00 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) =   492.30  DOWNSTREAM(FEET) =   491.40
  FLOW LENGTH(FEET) =    85.00   MANNING'S N =  0.013
  DEPTH OF FLOW IN  15.0 INCH PIPE IS  10.0 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   5.84
```

```
  ESTIMATED PIPE DIAMETER(INCH) =  15.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       5.06
  PIPE TRAVEL TIME(MIN.) =   0.24    Tc(MIN.) =    8.81
  LONGEST FLOWPATH FROM NODE      9.00 TO NODE    108.00 =     900.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE    108.00 TO NODE     27.00 IS CODE =  51
----------------------------------------------------------------------------
  >>>>>COMPUTE TRAPEZOIDAL CHANNEL FLOW<<<<<
  >>>>>TRAVELTIME THRU SUBAREA (EXISTING ELEMENT)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =    491.40  DOWNSTREAM(FEET) =    491.00
  CHANNEL LENGTH THRU SUBAREA(FEET) =    53.00   CHANNEL SLOPE =  0.0075
  CHANNEL BASE(FEET) =    4.00   "Z" FACTOR =   2.000
  MANNING'S FACTOR = 0.035   MAXIMUM DEPTH(FEET) =   2.00
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.483
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  TRAVEL TIME COMPUTED USING ESTIMATED FLOW(CFS) =       5.16
  TRAVEL TIME THRU SUBAREA BASED ON VELOCITY(FEET/SEC.) =   2.02
  AVERAGE FLOW DEPTH(FEET) =   0.51   TRAVEL TIME(MIN.) =   0.44
  Tc(MIN.) =    9.25
  SUBAREA AREA(ACRES) =     0.06       SUBAREA RUNOFF(CFS) =    0.19
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.315
  TOTAL AREA(ACRES) =        3.4         PEAK FLOW RATE(CFS) =       5.06

  END OF SUBAREA CHANNEL FLOW HYDRAULICS:
  DEPTH(FEET) =  0.50   FLOW VELOCITY(FEET/SEC.) =   2.02
  LONGEST FLOWPATH FROM NODE      9.00 TO NODE     27.00 =     953.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 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.) =    9.25
  RAINFALL INTENSITY(INCH/HR) =   4.48
  TOTAL STREAM AREA(ACRES) =     3.41
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      5.06

****************************************************************************
  FLOW PROCESS FROM NODE     28.00 TO NODE     27.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  URBAN NEWLY GRADED AREAS RUNOFF COEFFICIENT = .7100
  SOIL CLASSIFICATION IS "D"
  S.C.S. CURVE NUMBER (AMC II) =  94
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   150.00
  UPSTREAM ELEVATION(FEET) =    501.20
  DOWNSTREAM ELEVATION(FEET) =    491.00
  ELEVATION DIFFERENCE(FEET) =     10.20
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    3.646
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    96.80
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.666
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
```

```
  SUBAREA RUNOFF(CFS) =      0.14
  TOTAL AREA(ACRES) =      0.03   TOTAL RUNOFF(CFS) =      0.14

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 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.) =    3.65
  RAINFALL INTENSITY(INCH/HR) =   6.67
  TOTAL STREAM AREA(ACRES) =     0.03
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.14

****************************************************************************
  FLOW PROCESS FROM NODE     29.00 TO NODE     27.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6600
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  77
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   148.00
  UPSTREAM ELEVATION(FEET) =    498.00
  DOWNSTREAM ELEVATION(FEET) =    491.00
  ELEVATION DIFFERENCE(FEET) =      7.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    4.583
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    94.32
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.666
  NOTE: RAINFALL INTENSITY IS BASED ON Tc = 5-MINUTE.
  SUBAREA RUNOFF(CFS) =      0.62
  TOTAL AREA(ACRES) =      0.14   TOTAL RUNOFF(CFS) =      0.62

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 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.) =    4.58
  RAINFALL INTENSITY(INCH/HR) =   6.67
  TOTAL STREAM AREA(ACRES) =     0.14
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.62

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     27.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
============================================================================
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6600
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  77
  INITIAL SUBAREA FLOW-LENGTH(FEET) =    93.00
  UPSTREAM ELEVATION(FEET) =    494.00
  DOWNSTREAM ELEVATION(FEET) =    491.00
  ELEVATION DIFFERENCE(FEET) =      3.00
  SUBAREA OVERLAND TIME OF FLOW(MIN.) =    5.101
```

```
  WARNING: INITIAL SUBAREA FLOW PATH LENGTH IS GREATER THAN
           THE MAXIMUM OVERLAND FLOW LENGTH =    90.56
           (Reference: Table 3-1B of Hydrology Manual)
           THE MAXIMUM OVERLAND FLOW LENGTH IS USED IN Tc CALCULATION!
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  6.580
  SUBAREA RUNOFF(CFS) =      0.30
  TOTAL AREA(ACRES) =      0.07   TOTAL RUNOFF(CFS) =      0.30

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     27.00 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.) =    5.10
  RAINFALL INTENSITY(INCH/HR) =   6.58
  TOTAL STREAM AREA(ACRES) =     0.07
  PEAK FLOW RATE(CFS) AT CONFLUENCE =      0.30

  ** CONFLUENCE DATA **
  STREAM     RUNOFF       Tc      INTENSITY      AREA
  NUMBER      (CFS)     (MIN.)   (INCH/HOUR)    (ACRE)
      1        5.06     9.25        4.483          3.41
      2        0.14     3.65        6.666          0.03
      3        0.62     4.58        6.666          0.14
      4        0.30     5.10        6.580          0.07

  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        2.85     3.65       6.666
      2        3.54     4.58       6.666
      3        3.85     5.10       6.580
      4        5.78     9.25       4.483

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       5.78   Tc(MIN.) =    9.25
  TOTAL AREA(ACRES) =        3.6
  LONGEST FLOWPATH FROM NODE      9.00 TO NODE     27.00 =     953.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     27.00 TO NODE     31.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  491.00  DOWNSTREAM ELEVATION(FEET) =  439.00
  STREET LENGTH(FEET) =   609.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  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) =       9.30
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.31
    HALFSTREET FLOOD WIDTH(FEET) =    8.16
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    5.90
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.82
  STREET FLOW TRAVEL TIME(MIN.) =   1.72   Tc(MIN.) =   10.97
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  4.016
  RESIDENTIAL (24. DU/AC OR LESS) RUNOFF COEFFICIENT = .6600
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  77
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.474
  SUBAREA AREA(ACRES) =    2.66      SUBAREA RUNOFF(CFS) =    7.05
  TOTAL AREA(ACRES) =        6.3        PEAK FLOW RATE(CFS) =      12.01

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.33   HALFSTREET FLOOD WIDTH(FEET) =   9.28
  FLOW VELOCITY(FEET/SEC.) =  6.23   DEPTH*VELOCITY(FT*FT/SEC.) =   2.05
  LONGEST FLOWPATH FROM NODE      9.00 TO NODE     31.00 =    1562.00 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     31.00 TO NODE   1000.00 IS CODE =  62
----------------------------------------------------------------------------
  >>>>>COMPUTE STREET FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>(STREET TABLE SECTION #  1 USED)<<<<<
============================================================================
  UPSTREAM ELEVATION(FEET) =  439.00  DOWNSTREAM ELEVATION(FEET) =  436.00
  STREET LENGTH(FEET) =   298.00   CURB HEIGHT(INCHES) =  8.0
  STREET HALFWIDTH(FEET) = 30.00

  DISTANCE FROM CROWN TO CROSSFALL GRADEBREAK(FEET) =  20.00
  INSIDE STREET CROSSFALL(DECIMAL) =  0.018
  OUTSIDE STREET CROSSFALL(DECIMAL)  =  0.018

  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) =      12.54
    STREETFLOW MODEL RESULTS USING ESTIMATED FLOW:
    STREET FLOW DEPTH(FEET) =  0.52
    HALFSTREET FLOOD WIDTH(FEET) =   20.27
    AVERAGE FLOW VELOCITY(FEET/SEC.) =    3.24
    PRODUCT OF DEPTH&VELOCITY(FT*FT/SEC.) =    1.70
  STREET FLOW TRAVEL TIME(MIN.) =   1.53   Tc(MIN.) =   12.50
   100 YEAR RAINFALL INTENSITY(INCH/HOUR) =  3.691
  GENERAL COMMERCIAL RUNOFF COEFFICIENT = .8000
  SOIL CLASSIFICATION IS "A"
  S.C.S. CURVE NUMBER (AMC II) =  89
  AREA-AVERAGE RUNOFF COEFFICIENT =  0.492
  SUBAREA AREA(ACRES) =    0.36      SUBAREA RUNOFF(CFS) =    1.06
  TOTAL AREA(ACRES) =        6.7        PEAK FLOW RATE(CFS) =      12.10

  END OF SUBAREA STREET FLOW HYDRAULICS:
  DEPTH(FEET) = 0.52   HALFSTREET FLOOD WIDTH(FEET) =  20.04
  FLOW VELOCITY(FEET/SEC.) =  3.20   DEPTH*VELOCITY(FT*FT/SEC.) =   1.67
  LONGEST FLOWPATH FROM NODE      9.00 TO NODE   1000.00 =    1860.00 FEET.

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

```
  FLOW PROCESS FROM NODE   1000.00 TO NODE   1000.00 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       12.10    12.50       3.691        6.67
  LONGEST FLOWPATH FROM NODE      9.00 TO NODE   1000.00 =    1860.00 FEET.

  ** MEMORY BANK #  1 CONFLUENCE DATA **
  STREAM     RUNOFF      Tc      INTENSITY     AREA
  NUMBER      (CFS)    (MIN.)   (INCH/HOUR)   (ACRE)
      1        9.72    11.32       3.936        4.38
  LONGEST FLOWPATH FROM NODE      1.00 TO NODE   1000.00 =    1380.00 FEET.

  ** PEAK FLOW RATE TABLE **
  STREAM    RUNOFF       Tc      INTENSITY
  NUMBER     (CFS)     (MIN.)   (INCH/HOUR)
      1      20.67      11.32        3.936
      2      21.21      12.50        3.691

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =      21.21   Tc(MIN.) =   12.50
  TOTAL AREA(ACRES) =       11.0

****************************************************************************
  FLOW PROCESS FROM NODE   1000.00 TO NODE   1000.00 IS CODE =  12
----------------------------------------------------------------------------
  >>>>>CLEAR MEMORY BANK # 1 <<<<<
============================================================================
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =       11.0  TC(MIN.) =     12.50
  PEAK FLOW RATE(CFS)   =      21.21
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

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CHAPTER 6 – MODIFIED-PULS DETENTIONS ROUTING

6.1 – Rational Method Hydrograph

BMP 1-1

RATIONAL METHOD HYDROGRAPH PROGRAM
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RUN DATE 3/29/2019
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 6 MIN.
6 HOUR RAINFALL 2.53 INCHES
BASIN AREA 0.73 ACRES
RUNOFF COEFFICIENT 0.71
PEAK DISCHARGE 3.17 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 6	DISCHARGE (CFS) = 0.1
TIME (MIN) = 12	DISCHARGE (CFS) = 0.1
TIME (MIN) = 18	DISCHARGE (CFS) = 0.1
TIME (MIN) = 24	DISCHARGE (CFS) = 0.1
TIME (MIN) = 30	DISCHARGE (CFS) = 0.1
TIME (MIN) = 36	DISCHARGE (CFS) = 0.1
TIME (MIN) = 42	DISCHARGE (CFS) = 0.1
TIME (MIN) = 48	DISCHARGE (CFS) = 0.1
TIME (MIN) = 54	DISCHARGE (CFS) = 0.1
TIME (MIN) = 60	DISCHARGE (CFS) = 0.1
TIME (MIN) = 66	DISCHARGE (CFS) = 0.1
TIME (MIN) = 72	DISCHARGE (CFS) = 0.1
TIME (MIN) = 78	DISCHARGE (CFS) = 0.1
TIME (MIN) = 84	DISCHARGE (CFS) = 0.1
TIME (MIN) = 90	DISCHARGE (CFS) = 0.1
TIME (MIN) = 96	DISCHARGE (CFS) = 0.1
TIME (MIN) = 102	DISCHARGE (CFS) = 0.1
TIME (MIN) = 108	DISCHARGE (CFS) = 0.1
TIME (MIN) = 114	DISCHARGE (CFS) = 0.1
TIME (MIN) = 120	DISCHARGE (CFS) = 0.1
TIME (MIN) = 126	DISCHARGE (CFS) = 0.1
TIME (MIN) = 132	DISCHARGE (CFS) = 0.1
TIME (MIN) = 138	DISCHARGE (CFS) = 0.1
TIME (MIN) = 144	DISCHARGE (CFS) = 0.1
TIME (MIN) = 150	DISCHARGE (CFS) = 0.1
TIME (MIN) = 156	DISCHARGE (CFS) = 0.1
TIME (MIN) = 162	DISCHARGE (CFS) = 0.2
TIME (MIN) = 168	DISCHARGE (CFS) = 0.2
TIME (MIN) = 174	DISCHARGE (CFS) = 0.2
TIME (MIN) = 180	DISCHARGE (CFS) = 0.2
TIME (MIN) = 186	DISCHARGE (CFS) = 0.2
TIME (MIN) = 192	DISCHARGE (CFS) = 0.2
TIME (MIN) = 198	DISCHARGE (CFS) = 0.2
TIME (MIN) = 204	DISCHARGE (CFS) = 0.2
TIME (MIN) = 210	DISCHARGE (CFS) = 0.3
TIME (MIN) = 216	DISCHARGE (CFS) = 0.3
TIME (MIN) = 222	DISCHARGE (CFS) = 0.4
TIME (MIN) = 228	DISCHARGE (CFS) = 0.4
TIME (MIN) = 234	DISCHARGE (CFS) = 0.6
TIME (MIN) = 240	DISCHARGE (CFS) = 0.8
TIME (MIN) = 246	DISCHARGE (CFS) = 3.17
TIME (MIN) = 252	DISCHARGE (CFS) = 0.5
TIME (MIN) = 258	DISCHARGE (CFS) = 0.3
TIME (MIN) = 264	DISCHARGE (CFS) = 0.3
TIME (MIN) = 270	DISCHARGE (CFS) = 0.2
TIME (MIN) = 276	DISCHARGE (CFS) = 0.2
TIME (MIN) = 282	DISCHARGE (CFS) = 0.2
TIME (MIN) = 288	DISCHARGE (CFS) = 0.2
TIME (MIN) = 294	DISCHARGE (CFS) = 0.1
TIME (MIN) = 300	DISCHARGE (CFS) = 0.1
TIME (MIN) = 306	DISCHARGE (CFS) = 0.1
TIME (MIN) = 312	DISCHARGE (CFS) = 0.1
TIME (MIN) = 318	DISCHARGE (CFS) = 0.1
TIME (MIN) = 324	DISCHARGE (CFS) = 0.1
TIME (MIN) = 330	DISCHARGE (CFS) = 0.1
TIME (MIN) = 336	DISCHARGE (CFS) = 0.1
TIME (MIN) = 342	DISCHARGE (CFS) = 0.1
TIME (MIN) = 348	DISCHARGE (CFS) = 0.1
TIME (MIN) = 354	DISCHARGE (CFS) = 0.1
TIME (MIN) = 360	DISCHARGE (CFS) = 0.1
TIME (MIN) = 366	DISCHARGE (CFS) = 0

BMP 1-2

RATIONAL METHOD HYDROGRAPH PROGRAM
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RUN DATE 3/29/2019
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 6 MIN.
6 HOUR RAINFALL 2.53 INCHES
BASIN AREA 0.13 ACRES
RUNOFF COEFFICIENT 0.71
PEAK DISCHARGE 0.57 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
TIME (MIN) = 6	DISCHARGE (CFS) = 0
TIME (MIN) = 12	DISCHARGE (CFS) = 0
TIME (MIN) = 18	DISCHARGE (CFS) = 0
TIME (MIN) = 24	DISCHARGE (CFS) = 0
TIME (MIN) = 30	DISCHARGE (CFS) = 0
TIME (MIN) = 36	DISCHARGE (CFS) = 0
TIME (MIN) = 42	DISCHARGE (CFS) = 0
TIME (MIN) = 48	DISCHARGE (CFS) = 0
TIME (MIN) = 54	DISCHARGE (CFS) = 0
TIME (MIN) = 60	DISCHARGE (CFS) = 0
TIME (MIN) = 66	DISCHARGE (CFS) = 0
TIME (MIN) = 72	DISCHARGE (CFS) = 0
TIME (MIN) = 78	DISCHARGE (CFS) = 0
TIME (MIN) = 84	DISCHARGE (CFS) = 0
TIME (MIN) = 90	DISCHARGE (CFS) = 0
TIME (MIN) = 96	DISCHARGE (CFS) = 0
TIME (MIN) = 102	DISCHARGE (CFS) = 0
TIME (MIN) = 108	DISCHARGE (CFS) = 0
TIME (MIN) = 114	DISCHARGE (CFS) = 0
TIME (MIN) = 120	DISCHARGE (CFS) = 0
TIME (MIN) = 126	DISCHARGE (CFS) = 0
TIME (MIN) = 132	DISCHARGE (CFS) = 0
TIME (MIN) = 138	DISCHARGE (CFS) = 0
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TIME (MIN) = 174	DISCHARGE (CFS) = 0
TIME (MIN) = 180	DISCHARGE (CFS) = 0
TIME (MIN) = 186	DISCHARGE (CFS) = 0
TIME (MIN) = 192	DISCHARGE (CFS) = 0
TIME (MIN) = 198	DISCHARGE (CFS) = 0
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TIME (MIN) = 210	DISCHARGE (CFS) = 0
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TIME (MIN) = 294	DISCHARGE (CFS) = 0
TIME (MIN) = 300	DISCHARGE (CFS) = 0
TIME (MIN) = 306	DISCHARGE (CFS) = 0
TIME (MIN) = 312	DISCHARGE (CFS) = 0
TIME (MIN) = 318	DISCHARGE (CFS) = 0
TIME (MIN) = 324	DISCHARGE (CFS) = 0
TIME (MIN) = 330	DISCHARGE (CFS) = 0
TIME (MIN) = 336	DISCHARGE (CFS) = 0
TIME (MIN) = 342	DISCHARGE (CFS) = 0
TIME (MIN) = 348	DISCHARGE (CFS) = 0
TIME (MIN) = 354	DISCHARGE (CFS) = 0
TIME (MIN) = 360	DISCHARGE (CFS) = 0
TIME (MIN) = 366	DISCHARGE (CFS) = 0

BMP 1-3

RATIONAL METHOD HYDROGRAPH PROGRAM
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RUN DATE 4/1/2019
HYDROGRAPH FILE NAME Text1
TIME OF CONCENTRATION 6 MIN.
6 HOUR RAINFALL 2.53 INCHES
BASIN AREA 0.37 ACRES
RUNOFF COEFFICIENT 0.71
PEAK DISCHARGE 1.46 CFS

TIME (MIN) = 0	DISCHARGE (CFS) = 0
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TIME (MIN) = 18	DISCHARGE (CFS) = 0
TIME (MIN) = 24	DISCHARGE (CFS) = 0
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TIME (MIN) = 72	DISCHARGE (CFS) = 0
TIME (MIN) = 78	DISCHARGE (CFS) = 0
TIME (MIN) = 84	DISCHARGE (CFS) = 0.1
TIME (MIN) = 90	DISCHARGE (CFS) = 0.1
TIME (MIN) = 96	DISCHARGE (CFS) = 0.1
TIME (MIN) = 102	DISCHARGE (CFS) = 0.1
TIME (MIN) = 108	DISCHARGE (CFS) = 0.1
TIME (MIN) = 114	DISCHARGE (CFS) = 0.1
TIME (MIN) = 120	DISCHARGE (CFS) = 0.1
TIME (MIN) = 126	DISCHARGE (CFS) = 0.1
TIME (MIN) = 132	DISCHARGE (CFS) = 0.1
TIME (MIN) = 138	DISCHARGE (CFS) = 0.1
TIME (MIN) = 144	DISCHARGE (CFS) = 0.1
TIME (MIN) = 150	DISCHARGE (CFS) = 0.1
TIME (MIN) = 156	DISCHARGE (CFS) = 0.1
TIME (MIN) = 162	DISCHARGE (CFS) = 0.1
TIME (MIN) = 168	DISCHARGE (CFS) = 0.1
TIME (MIN) = 174	DISCHARGE (CFS) = 0.1
TIME (MIN) = 180	DISCHARGE (CFS) = 0.1
TIME (MIN) = 186	DISCHARGE (CFS) = 0.1
TIME (MIN) = 192	DISCHARGE (CFS) = 0.1
TIME (MIN) = 198	DISCHARGE (CFS) = 0.1
TIME (MIN) = 204	DISCHARGE (CFS) = 0.1
TIME (MIN) = 210	DISCHARGE (CFS) = 0.1
TIME (MIN) = 216	DISCHARGE (CFS) = 0.2
TIME (MIN) = 222	DISCHARGE (CFS) = 0.2
TIME (MIN) = 228	DISCHARGE (CFS) = 0.2
TIME (MIN) = 234	DISCHARGE (CFS) = 0.3
TIME (MIN) = 240	DISCHARGE (CFS) = 0.5
TIME (MIN) = 246	DISCHARGE (CFS) = 1.46
TIME (MIN) = 252	DISCHARGE (CFS) = 0.2
TIME (MIN) = 258	DISCHARGE (CFS) = 0.2
TIME (MIN) = 264	DISCHARGE (CFS) = 0.1
TIME (MIN) = 270	DISCHARGE (CFS) = 0.1
TIME (MIN) = 276	DISCHARGE (CFS) = 0.1
TIME (MIN) = 282	DISCHARGE (CFS) = 0.1
TIME (MIN) = 288	DISCHARGE (CFS) = 0.1
TIME (MIN) = 294	DISCHARGE (CFS) = 0.1
TIME (MIN) = 300	DISCHARGE (CFS) = 0.1
TIME (MIN) = 306	DISCHARGE (CFS) = 0.1
TIME (MIN) = 312	DISCHARGE (CFS) = 0.1
TIME (MIN) = 318	DISCHARGE (CFS) = 0.1
TIME (MIN) = 324	DISCHARGE (CFS) = 0.1
TIME (MIN) = 330	DISCHARGE (CFS) = 0
TIME (MIN) = 336	DISCHARGE (CFS) = 0
TIME (MIN) = 342	DISCHARGE (CFS) = 0
TIME (MIN) = 348	DISCHARGE (CFS) = 0
TIME (MIN) = 354	DISCHARGE (CFS) = 0
TIME (MIN) = 360	DISCHARGE (CFS) = 0
TIME (MIN) = 366	DISCHARGE (CFS) = 0

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6.2 – Stage-Storage & Stage-Discharge Relationships

Stage-Area for BMP 1-1

Elevation (ft)	Area	Volume (ft^3)	
0.00	940	0	**BIOFILTRATION(1)**
0.01	940	4	
0.08	940	31	
0.17	940	63	
0.25	940	94	**TOP OF MULCH(2)**
0.33	940	172	
0.42	940	251	
0.50	940	329	
0.58	940	407	
0.67	940	486	
0.75	940	564	**SURFACE DISCHARGE(3)**
0.83	940	642	
0.92	940	721	
1.00	940	799	
1.08	940	877	
1.17	940	956	
1.25	940	1034	
1.33	940	1112	
1.42	940	1191	
1.50	940	1269	
1.58	940	1347	
1.67	940	1426	
1.75	940	1504	
1.83	940	1582	
1.92	940	1661	
2.00	940	1739	
2.08	940	1817	
2.17	940	1896	
2.25	940	1974	**EMERGENCY WEIR(4)**
2.33	940	2052	
2.42	940	2131	
2.50	940	2209	
2.58	940	2287	
2.67	940	2366	
2.75	940	2444	
2.83	940	2522	
2.92	940	2601	
3.00	940	2679	
3.08	940	2757	

3.17	940	2836
3.25	940	2914
3.33	940	2992
3.42	940	3071
3.50	940	3149
3.58	940	3227
3.67	940	3306
3.75	940	3384

Sub-Surface Storage for BMP 1-1

Elevation (ft)	Area (ft^2)	Volume (ft^3)	
-1.50	940	423	**Amended Soil Base (0.3 voids)**
-3.00	940	564	**Gravel Base (0.4 voids)[5]**
Gravel & Amended Soil	**TOTAL**	987	(ft^3)
Surface Total	**TOTAL**	564	(ft^3)
IMP	**TOTAL**	**1551**	**(ft^3)**

(1): The area at this surface elevation corresponds to the area of gravel and amended soil (Bio-filtration
(2): The volume for the first 3 inches of surface depth accounts for the voids of mulch
(3): Volume at this elevation corresponds with surface volume for WQ purposes (invert of lowest
(4): This elevation corresponds to the top of the riser elevation.
(5): Gravel Depth includes three (3) inches of storage below the LID orifice.

Outlet Structure for Discharge of BMP 1-1
Discharge vs Elevation Table

Low Orifice
Orifice Size: 0.50”
# of orifice: 3

Emergency Weir
Invert: 2.50 ft
Perimeter: 6.28 ft

Note: Elevation 0 corresponds to the invert of the first surface outlet, 0.75 ft

h* (ft)	H/D-low -	H/D-mid -	Qlow-orif (cfs)	Qlow-weir (cfs)	Qtot-low (cfs)	Qemerg (cfs)	Qtot (cfs)
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.083	2.222	0.000	0.004	0.005	0.004	0.000	0.004
0.167	4.444	0.000	0.006	0.017	0.006	0.000	0.006
0.250	6.667	0.000	0.008	0.079	0.008	0.000	0.008
0.333	8.889	0.000	0.009	0.092	0.009	0.000	0.009
0.417	11.111	0.000	0.010	0.104	0.010	0.000	0.010
0.500	13.333	0.000	0.011	0.114	0.011	0.000	0.011
0.583	15.556	1.000	0.012	0.124	0.012	0.000	0.012
0.667	17.778	2.000	0.013	0.133	0.013	0.000	0.013
0.750	20.000	3.000	0.014	0.141	0.014	0.000	0.014
0.833	22.222	4.000	0.015	0.149	0.015	0.000	0.015
0.917	24.444	5.000	0.016	0.156	0.016	0.000	0.016
1.000	26.667	6.000	0.016	0.163	0.016	0.000	0.016
1.083	28.889	7.000	0.017	0.170	0.017	0.000	0.017
1.167	31.111	8.000	0.018	0.177	0.018	0.000	0.018
1.250	33.333	9.000	0.018	0.183	0.018	0.000	0.018
1.333	35.556	10.000	0.019	0.189	0.019	0.000	0.019
1.417	37.778	11.000	0.019	0.195	0.019	0.000	0.019
1.500	40.000	12.000	0.020	0.201	0.020	0.000	0.020
1.583	42.222	13.000	0.021	0.206	0.021	0.000	0.021
1.667	44.444	14.000	0.021	0.212	0.021	0.000	0.021
1.750	46.667	15.000	0.022	0.217	0.022	0.000	0.022
1.833	48.889	16.000	0.022	0.222	0.022	0.000	0.022
1.917	51.111	17.000	0.023	0.227	0.023	0.000	0.023
2.000	53.333	18.000	0.023	0.232	0.023	0.000	0.023
2.083	55.556	19.000	0.024	0.237	0.024	0.000	0.024
2.167	57.778	20.000	0.024	0.242	0.024	0.000	0.024
2.250	60.000	21.000	0.025	0.246	0.025	0.000	0.025
2.333	62.222	22.000	0.025	0.251	0.025	0.000	0.025

2.417	64.444	23.000	0.026	0.255	0.026	0.000	0.026
2.500	66.667	24.000	0.026	0.260	0.026	0.000	0.026
2.583	68.889	25.000	0.026	0.264	0.026	0.469	0.495
2.667	71.111	26.000	0.027	0.268	0.027	1.325	1.352
2.750	73.333	27.000	0.027	0.272	0.027	2.435	2.462
2.833	75.556	28.000	0.028	0.277	0.028	3.749	3.776
2.917	77.778	29.000	0.028	0.281	0.028	5.239	5.267
3.000	80.000	30.000	0.028	0.285	0.028	6.886	6.915

Stage-Area for BMP 1-2

Elevation (ft)	Area (ft^2)	Volume (ft^3)	
0.00	845	0	**BIOFILTRATION[1]**
0.01	845	3	
0.08	845	28	
0.17	845	56	
0.25	845	85	**TOP OF MULCH[2]**
0.33	845	155	
0.42	845	225	
0.50	845	296	
0.58	845	366	
0.67	845	437	
0.75	845	507	**SURFACE DISCHARGE[3]**
0.83	845	577	
0.92	845	648	
1.00	845	718	
1.08	845	789	
1.17	845	859	
1.25	845	930	
1.33	845	1000	
1.42	845	1070	
1.50	845	1141	
1.58	845	1211	
1.67	845	1282	
1.75	845	1352	
1.83	845	1422	
1.92	845	1493	
2.00	845	1563	
2.08	845	1634	
2.17	845	1704	
2.25	845	1775	**EMERGENCY WEIR[4]**
2.33	845	1845	
2.42	845	1915	
2.50	845	1986	
2.58	845	2056	
2.67	845	2127	
2.75	845	2197	
2.83	845	2267	
2.92	845	2338	
3.00	845	2408	

Sub-Surface Storage for BMP 1-2

Elevation (ft)	Area (ft^2)	Volume (ft^3)	
-1.50	845	380	**Amended Soil Base (0.3 voids)**
-3.00	845	507	**Gravel Base (0.4 voids)(5)**
Gravel & Amended Soil	**TOTAL**	887	(ft^3)
Surface Total	**TOTAL**	507	(ft^3)
IMP	**TOTAL**	**1394**	**(ft^3)**

(1): The area at this surface elevation corresponds to the area of gravel and amended soil (Bio-filtration
(2): The volume for the first 3 inches of surface depth accounts for the voids of mulch
(3): Volume at this elevation corresponds with surface volume for WQ purposes (invert of lowest
(4): This elevation corresponds to the top of the riser elevation.
(5): Gravel Depth includes three (3) inches of storage below the LID orifice.

Outlet Structure for Discharge of BMP 1-2
Discharge vs Elevation Table

Low Orifice
Orifice Size: 0.25”
# of orifice: 1

Emergency Weir
Invert: 1.75 ft
Perimeter: 6.28 ft

Note: Elevation 0 corresponds to the invert of the first surface outlet, 0.75 ft

h* (ft)	H/D-low -	H/D-mid -	Qlow-orif (cfs)	Qlow-weir (cfs)	Qtot-low (cfs)	Qemerg (cfs)	Qtot (cfs)
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.083	0.500	0.000	0.000	0.009	0.009	0.000	0.009
0.167	1.000	0.000	0.031	0.029	0.029	0.000	0.029
0.250	1.500	0.000	0.044	0.053	0.044	0.000	0.044
0.333	2.000	0.000	0.054	0.071	0.054	0.000	0.054
0.417	2.500	0.000	0.063	0.079	0.063	0.000	0.063
0.500	3.000	0.000	0.070	0.080	0.070	0.000	0.070
0.583	3.500	0.000	0.077	0.089	0.077	0.000	0.077
0.667	4.000	0.000	0.083	0.134	0.083	0.000	0.083
0.750	4.500	0.000	0.089	0.262	0.089	0.000	0.089
0.833	5.000	0.000	0.094	0.540	0.094	0.000	0.094
0.917	5.500	0.000	0.099	0.991	0.099	0.000	0.099
1.000	6.000	0.000	0.104	1.039	0.104	0.000	0.104
1.083	6.500	0.999	0.109	1.085	0.109	0.000	0.109
1.167	7.000	1.999	0.113	1.130	0.113	0.000	0.113
1.250	7.500	2.999	0.117	1.172	0.117	0.000	0.117
1.333	8.000	3.999	0.121	1.214	0.121	0.000	0.121
1.417	8.500	4.999	0.125	1.253	0.125	0.000	0.125
1.500	9.000	5.999	0.129	1.292	0.129	0.000	0.129
1.583	9.500	6.999	0.133	1.329	0.133	0.000	0.133
1.667	10.000	7.999	0.137	1.366	0.137	0.000	0.137
1.750	10.500	8.999	0.140	1.401	0.140	0.000	0.140
1.833	11.000	9.999	0.144	1.436	0.144	0.469	0.612
1.917	11.500	10.999	0.147	1.470	0.147	1.325	1.472
2.000	12.000	11.999	0.150	1.503	0.150	2.435	2.585
2.083	12.500	12.999	0.154	1.535	0.154	3.749	3.902
2.167	13.000	13.999	0.157	1.567	0.157	5.239	5.395
2.250	13.500	14.999	0.160	1.598	0.160	6.886	7.046

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Stage-Area for BMP 1-3

Elevation (ft)	Area (ft^2)	Volume (ft^3)	
0.00	580	0	**BIOFILTRATION[(1)]**
0.01	580	2	
0.08	580	19	
0.17	580	39	
0.25	580	58	**TOP OF MULCH[(2)]**
0.33	580	106	
0.42	580	155	
0.50	580	203	
0.58	580	251	
0.67	580	300	
0.75	580	348	**SURFACE DISCHARGE[(3)]**
0.83	580	396	
0.92	580	445	
1.00	580	493	
1.08	580	541	
1.17	580	590	
1.25	580	638	
1.33	580	686	
1.42	580	735	
1.50	580	783	
1.58	580	831	
1.67	580	880	
1.75	580	928	
1.83	580	976	
1.92	580	1025	
2.00	580	1073	
2.08	580	1121	
2.17	580	1170	
2.25	580	1218	**EMERGENCY WEIR[(4)]**
2.33	580	1266	
2.42	580	1315	
2.50	580	1363	
2.58	580	1411	
2.67	580	1460	
2.75	580	1508	
2.83	580	1556	
2.92	580	1605	
3.00	580	1653	

Sub-Surface Storage for BMP 1-3

Elevation (ft)	Area (ft^2)	Volume (ft^3)	
-1.50	580	261	**Amended Soil Base (0.3 voids)**
-3.00	580	348	**Gravel Base (0.4 voids)[5]**
Gravel & Amended Soil	**TOTAL**	609	(ft^3)
Surface Total	**TOTAL**	348	(ft^3)
IMP	**TOTAL**	**957**	**(ft^3)**

(1): The area at this surface elevation corresponds to the area of gravel and amended soil (Bio-filtration
(2): The volume for the first 3 inches of surface depth accounts for the voids of mulch
(3): Volume at this elevation corresponds with surface volume for WQ purposes (invert of lowest
(4): This elevation corresponds to the top of the riser elevation.
(5): Gravel Depth includes three (3) inches of storage below the LID orifice.

Outlet Structure for Discharge of BMP 1-3
Discharge vs Elevation Table

Low Orifice
Orifice Size: 0.25”
# of orifice: 3

Emergency Weir
Invert: 1.75 ft
Perimeter: 6.28 ft

Note: Elevation 0 corresponds to the invert of the first surface outlet, 0.75 ft

h* (ft)	H/D-low -	H/D-mid -	Qlow-orif (cfs)	Qlow-weir (cfs)	Qtot-low (cfs)	Qemerg (cfs)	Qtot (cfs)
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0.083	0.500	0.000	0.000	0.026	0.026	0.000	0.026
0.167	1.000	0.000	0.094	0.088	0.088	0.000	0.088
0.250	1.500	0.000	0.133	0.159	0.133	0.000	0.133
0.333	2.000	0.000	0.163	0.213	0.163	0.000	0.163
0.417	2.500	0.000	0.188	0.236	0.188	0.000	0.188
0.500	3.000	0.000	0.210	0.240	0.210	0.000	0.210
0.583	3.500	0.000	0.230	0.267	0.230	0.000	0.230
0.667	4.000	0.000	0.249	0.402	0.249	0.000	0.249
0.750	4.500	0.000	0.266	0.785	0.266	0.000	0.266
0.833	5.000	0.000	0.282	1.620	0.282	0.000	0.282
0.917	5.500	0.000	0.297	2.973	0.297	0.000	0.297
1.000	6.000	0.000	0.312	3.118	0.312	0.000	0.312
1.083	6.500	0.999	0.326	3.256	0.326	0.000	0.326
1.167	7.000	1.999	0.339	3.389	0.339	0.000	0.339
1.250	7.500	2.999	0.352	3.517	0.352	0.000	0.352
1.333	8.000	3.999	0.364	3.641	0.364	0.000	0.364
1.417	8.500	4.999	0.376	3.760	0.376	0.000	0.376
1.500	9.000	5.999	0.388	3.876	0.388	0.000	0.388
1.583	9.500	6.999	0.399	3.988	0.399	0.000	0.399
1.667	10.000	7.999	0.410	4.098	0.410	0.000	0.410
1.750	10.500	8.999	0.420	4.204	0.420	0.000	0.420
1.833	11.000	9.999	0.431	4.308	0.431	0.469	0.899
1.917	11.500	10.999	0.441	4.409	0.441	1.325	1.766
2.000	12.000	11.999	0.451	4.508	0.451	2.435	2.886
2.083	12.500	12.999	0.461	4.605	0.461	3.749	4.209
2.167	13.000	13.999	0.470	4.700	0.470	5.239	5.709
2.250	13.500	14.999	0.479	4.793	0.479	6.886	7.366

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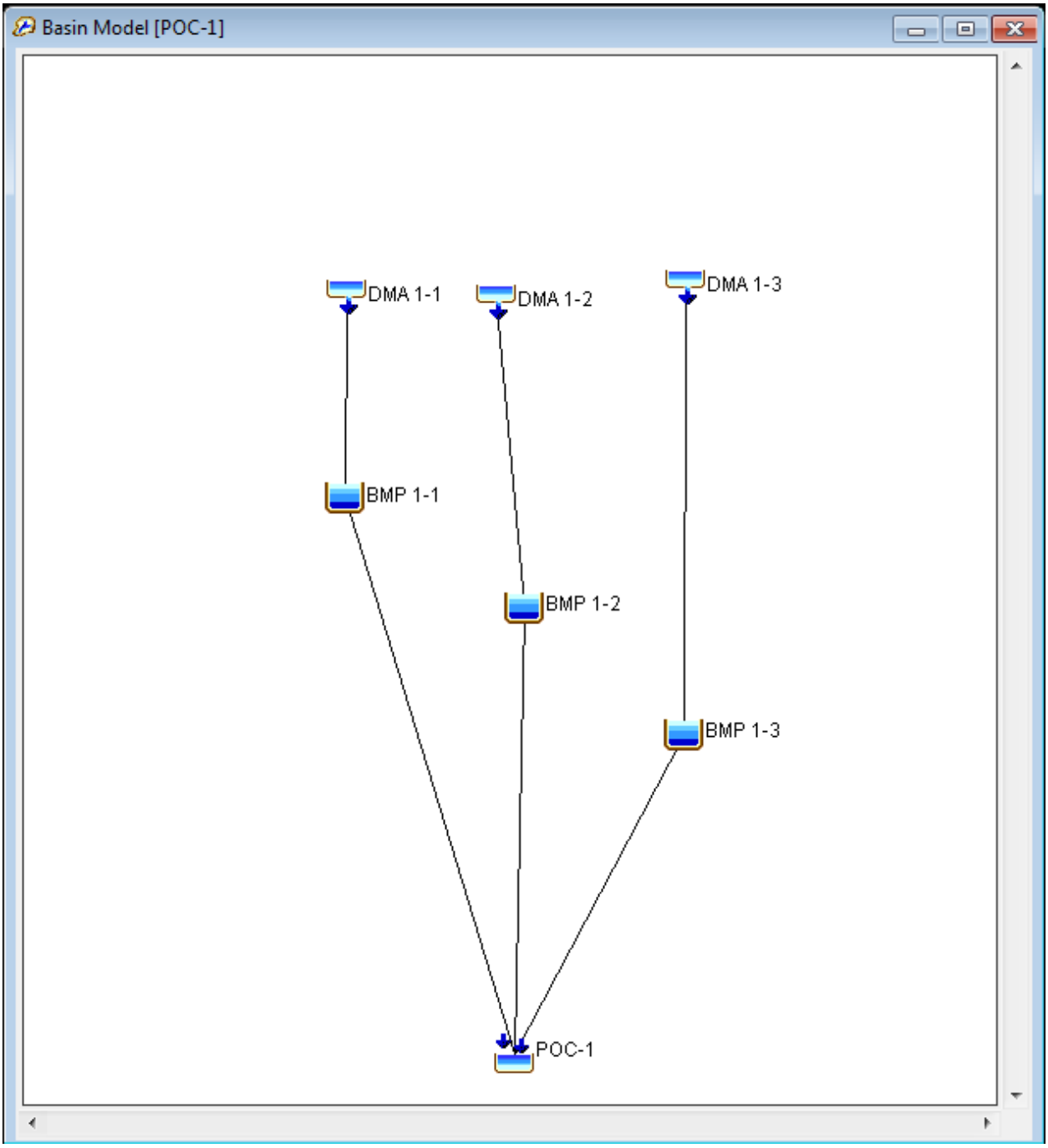
6.3 – HEC-HMS Modified-Puls Routing Results

HEC-HMS POST DEVELOPMENT



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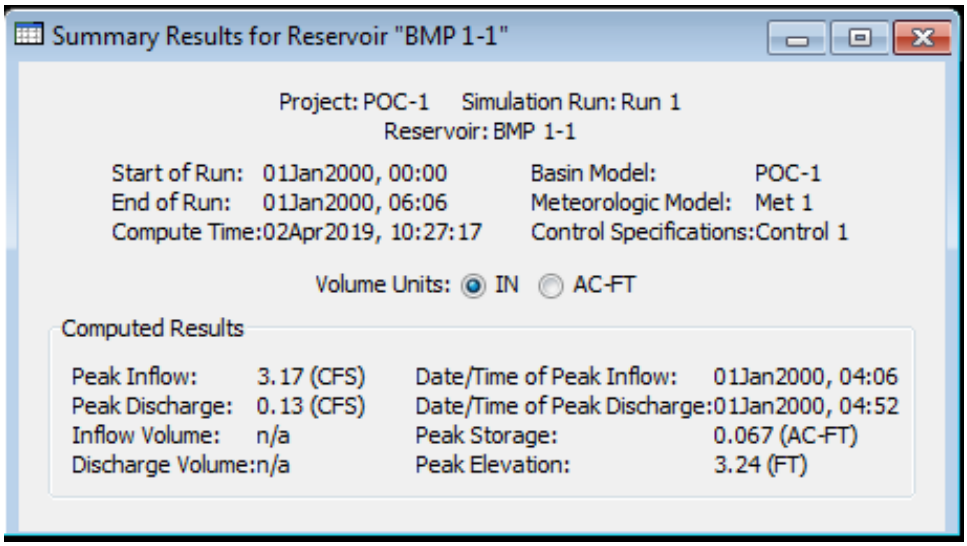
Summary Results for Reservoir "BMP 1-1"
Project: POC-1 Simulation Run: Run 1
Reservoir: BMP 1-1
Start of Run: 01Jan2000, 00:00
End of Run: 01Jan2000, 06:06
Compute Time: 02Apr2019, 10:27:17
Basin Model: POC-1
Meteorologic Model: Met 1
Control Specifications: Control 1
Volume Units: IN AC-FT
Computed Results
Peak Inflow: 3.17 (CFS)
Peak Discharge: 0.13 (CFS)
Inflow Volume: n/a
Discharge Volume: n/a
Date/Time of Peak Inflow: 01Jan2000, 04:06
Date/Time of Peak Discharge: 01Jan2000, 04:52
Peak Storage: 0.067 (AC-FT)
Peak Elevation: 3.24 (FT)

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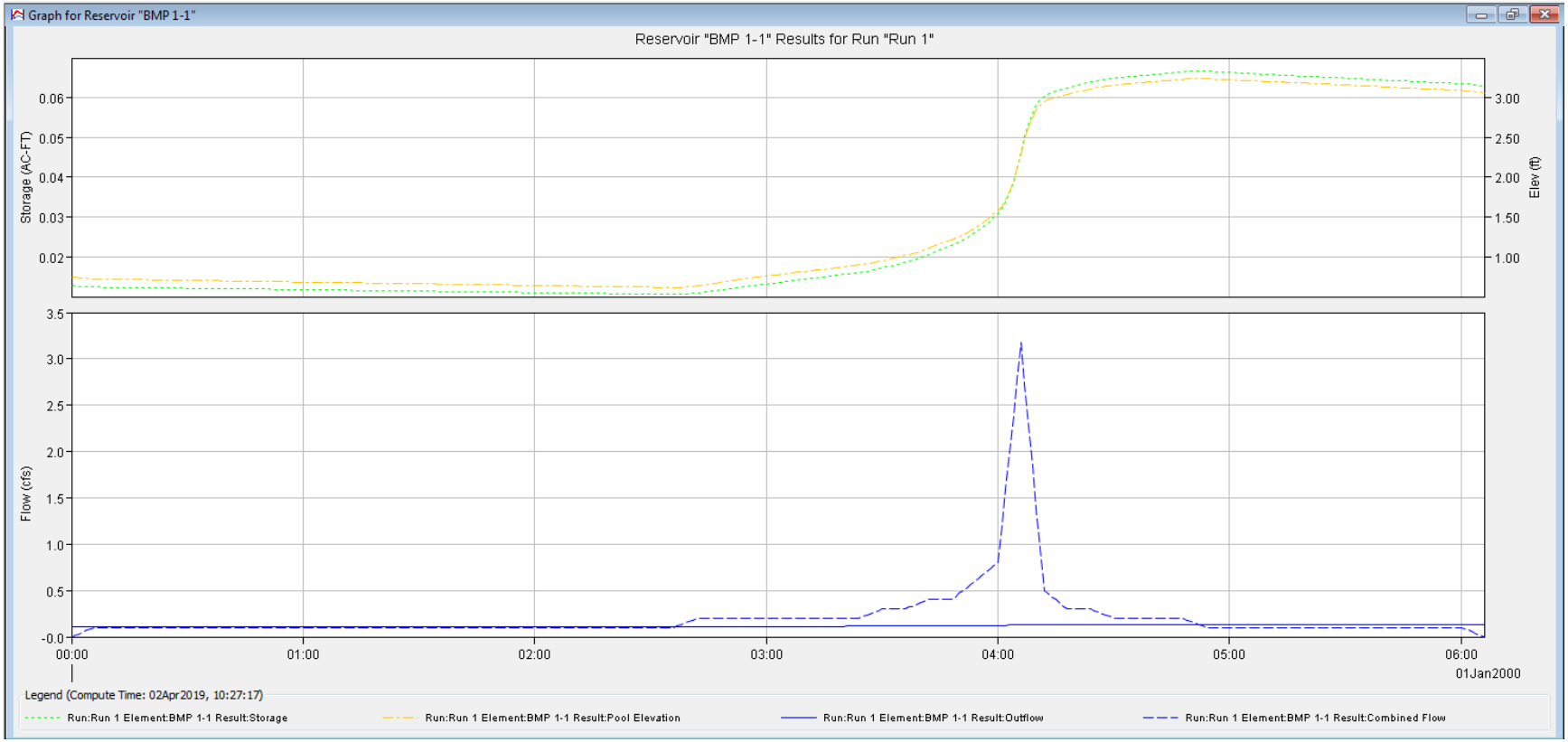
Graph for Reservoir "BMP 1-1"
Reservoir "BMP 1-1" Results for Run "Run 1"
Storage (AC-FT)
0.06
0.05
0.04
0.03
0.02
Elev (ft)
3.00
2.50
2.00
1.50
1.00
Flow (cfs)
3.5
3.0
2.5
2.0
1.5
1.0
0.5
-0.0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
01Jan2000
Legend (Compute Time: 02Apr2019, 10:27:17)
Run:Run 1 Element:BMP 1-1 Result:Storage
Run:Run 1 Element:BMP 1-1 Result:Pool Elevation
Run:Run 1 Element:BMP 1-1 Result:Outflow
Run:Run 1 Element:BMP 1-1 Result:Combined Flow

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Project: POC-1 Simulation Run: Run 1
Reservoir: BMP 1-1

Start of Run: 01Jan2000, 00:00 Basin Model: POC-1
End of Run: 01Jan2000, 06:06 Meteorologic Model: Met 1
Compute Time: 29Mar2019, 11:43:02 Control Specifications: Control 1

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	00:00	0.00	0.013	0.75	0.11
01Jan2000	00:01	0.02	0.013	0.74	0.11
01Jan2000	00:02	0.03	0.013	0.74	0.11
01Jan2000	00:03	0.05	0.013	0.73	0.11
01Jan2000	00:04	0.07	0.012	0.73	0.11
01Jan2000	00:05	0.08	0.012	0.72	0.11
01Jan2000	00:06	0.10	0.012	0.72	0.11
01Jan2000	00:07	0.10	0.012	0.72	0.11
01Jan2000	00:08	0.10	0.012	0.72	0.11
01Jan2000	00:09	0.10	0.012	0.72	0.11
01Jan2000	00:10	0.10	0.012	0.72	0.11
01Jan2000	00:11	0.10	0.012	0.72	0.11
01Jan2000	00:12	0.10	0.012	0.72	0.11
01Jan2000	00:13	0.10	0.012	0.72	0.11
01Jan2000	00:14	0.10	0.012	0.72	0.11
01Jan2000	00:15	0.10	0.012	0.72	0.11
01Jan2000	00:16	0.10	0.012	0.71	0.11
01Jan2000	00:17	0.10	0.012	0.71	0.11
01Jan2000	00:18	0.10	0.012	0.71	0.11
01Jan2000	00:19	0.10	0.012	0.71	0.11
01Jan2000	00:20	0.10	0.012	0.71	0.11
01Jan2000	00:21	0.10	0.012	0.71	0.11
01Jan2000	00:22	0.10	0.012	0.71	0.11
01Jan2000	00:23	0.10	0.012	0.71	0.11
01Jan2000	00:24	0.10	0.012	0.71	0.11
01Jan2000	00:25	0.10	0.012	0.71	0.11

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	00:26	0.10	0.012	0.71	0.11
01Jan2000	00:27	0.10	0.012	0.71	0.11
01Jan2000	00:28	0.10	0.012	0.71	0.11
01Jan2000	00:29	0.10	0.012	0.71	0.11
01Jan2000	00:30	0.10	0.012	0.70	0.11
01Jan2000	00:31	0.10	0.012	0.70	0.11
01Jan2000	00:32	0.10	0.012	0.70	0.11
01Jan2000	00:33	0.10	0.012	0.70	0.11
01Jan2000	00:34	0.10	0.012	0.70	0.11
01Jan2000	00:35	0.10	0.012	0.70	0.11
01Jan2000	00:36	0.10	0.012	0.70	0.11
01Jan2000	00:37	0.10	0.012	0.70	0.11
01Jan2000	00:38	0.10	0.012	0.70	0.11
01Jan2000	00:39	0.10	0.012	0.70	0.11
01Jan2000	00:40	0.10	0.012	0.70	0.11
01Jan2000	00:41	0.10	0.012	0.70	0.11
01Jan2000	00:42	0.10	0.012	0.70	0.11
01Jan2000	00:43	0.10	0.012	0.70	0.11
01Jan2000	00:44	0.10	0.012	0.69	0.11
01Jan2000	00:45	0.10	0.012	0.69	0.11
01Jan2000	00:46	0.10	0.012	0.69	0.11
01Jan2000	00:47	0.10	0.012	0.69	0.11
01Jan2000	00:48	0.10	0.012	0.69	0.11
01Jan2000	00:49	0.10	0.012	0.69	0.11
01Jan2000	00:50	0.10	0.012	0.69	0.11
01Jan2000	00:51	0.10	0.012	0.69	0.11
01Jan2000	00:52	0.10	0.012	0.69	0.11
01Jan2000	00:53	0.10	0.012	0.69	0.11
01Jan2000	00:54	0.10	0.012	0.69	0.11
01Jan2000	00:55	0.10	0.012	0.69	0.11
01Jan2000	00:56	0.10	0.012	0.69	0.11

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	00:57	0.10	0.012	0.69	0.11
01Jan2000	00:58	0.10	0.012	0.69	0.11
01Jan2000	00:59	0.10	0.012	0.68	0.11
01Jan2000	01:00	0.10	0.012	0.68	0.11
01Jan2000	01:01	0.10	0.012	0.68	0.11
01Jan2000	01:02	0.10	0.012	0.68	0.11
01Jan2000	01:03	0.10	0.012	0.68	0.11
01Jan2000	01:04	0.10	0.012	0.68	0.11
01Jan2000	01:05	0.10	0.012	0.68	0.11
01Jan2000	01:06	0.10	0.012	0.68	0.11
01Jan2000	01:07	0.10	0.012	0.68	0.11
01Jan2000	01:08	0.10	0.012	0.68	0.11
01Jan2000	01:09	0.10	0.012	0.68	0.11
01Jan2000	01:10	0.10	0.012	0.68	0.11
01Jan2000	01:11	0.10	0.012	0.68	0.11
01Jan2000	01:12	0.10	0.012	0.68	0.11
01Jan2000	01:13	0.10	0.012	0.67	0.11
01Jan2000	01:14	0.10	0.012	0.67	0.11
01Jan2000	01:15	0.10	0.012	0.67	0.11
01Jan2000	01:16	0.10	0.012	0.67	0.11
01Jan2000	01:17	0.10	0.012	0.67	0.11
01Jan2000	01:18	0.10	0.012	0.67	0.11
01Jan2000	01:19	0.10	0.012	0.67	0.11
01Jan2000	01:20	0.10	0.012	0.67	0.11
01Jan2000	01:21	0.10	0.011	0.67	0.11
01Jan2000	01:22	0.10	0.011	0.67	0.11
01Jan2000	01:23	0.10	0.011	0.67	0.11
01Jan2000	01:24	0.10	0.011	0.67	0.11
01Jan2000	01:25	0.10	0.011	0.67	0.11
01Jan2000	01:26	0.10	0.011	0.67	0.11
01Jan2000	01:27	0.10	0.011	0.66	0.11

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	01:28	0.10	0.011	0.66	0.11
01Jan2000	01:29	0.10	0.011	0.66	0.11
01Jan2000	01:30	0.10	0.011	0.66	0.11
01Jan2000	01:31	0.10	0.011	0.66	0.11
01Jan2000	01:32	0.10	0.011	0.66	0.11
01Jan2000	01:33	0.10	0.011	0.66	0.11
01Jan2000	01:34	0.10	0.011	0.66	0.11
01Jan2000	01:35	0.10	0.011	0.66	0.11
01Jan2000	01:36	0.10	0.011	0.66	0.11
01Jan2000	01:37	0.10	0.011	0.66	0.11
01Jan2000	01:38	0.10	0.011	0.66	0.11
01Jan2000	01:39	0.10	0.011	0.66	0.11
01Jan2000	01:40	0.10	0.011	0.66	0.11
01Jan2000	01:41	0.10	0.011	0.65	0.11
01Jan2000	01:42	0.10	0.011	0.65	0.11
01Jan2000	01:43	0.10	0.011	0.65	0.11
01Jan2000	01:44	0.10	0.011	0.65	0.11
01Jan2000	01:45	0.10	0.011	0.65	0.11
01Jan2000	01:46	0.10	0.011	0.65	0.11
01Jan2000	01:47	0.10	0.011	0.65	0.11
01Jan2000	01:48	0.10	0.011	0.65	0.11
01Jan2000	01:49	0.10	0.011	0.65	0.11
01Jan2000	01:50	0.10	0.011	0.65	0.11
01Jan2000	01:51	0.10	0.011	0.65	0.11
01Jan2000	01:52	0.10	0.011	0.65	0.11
01Jan2000	01:53	0.10	0.011	0.65	0.11
01Jan2000	01:54	0.10	0.011	0.65	0.11
01Jan2000	01:55	0.10	0.011	0.64	0.11
01Jan2000	01:56	0.10	0.011	0.64	0.11
01Jan2000	01:57	0.10	0.011	0.64	0.11
01Jan2000	01:58	0.10	0.011	0.64	0.11

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	01:59	0.10	0.011	0.64	0.11
01Jan2000	02:00	0.10	0.011	0.64	0.11
01Jan2000	02:01	0.10	0.011	0.64	0.11
01Jan2000	02:02	0.10	0.011	0.64	0.11
01Jan2000	02:03	0.10	0.011	0.64	0.11
01Jan2000	02:04	0.10	0.011	0.64	0.11
01Jan2000	02:05	0.10	0.011	0.64	0.11
01Jan2000	02:06	0.10	0.011	0.64	0.11
01Jan2000	02:07	0.10	0.011	0.64	0.11
01Jan2000	02:08	0.10	0.011	0.64	0.11
01Jan2000	02:09	0.10	0.011	0.63	0.11
01Jan2000	02:10	0.10	0.011	0.63	0.11
01Jan2000	02:11	0.10	0.011	0.63	0.11
01Jan2000	02:12	0.10	0.011	0.63	0.11
01Jan2000	02:13	0.10	0.011	0.63	0.11
01Jan2000	02:14	0.10	0.011	0.63	0.11
01Jan2000	02:15	0.10	0.011	0.63	0.11
01Jan2000	02:16	0.10	0.011	0.63	0.11
01Jan2000	02:17	0.10	0.011	0.63	0.11
01Jan2000	02:18	0.10	0.011	0.63	0.11
01Jan2000	02:19	0.10	0.011	0.63	0.11
01Jan2000	02:20	0.10	0.011	0.63	0.11
01Jan2000	02:21	0.10	0.011	0.63	0.11
01Jan2000	02:22	0.10	0.011	0.63	0.11
01Jan2000	02:23	0.10	0.011	0.62	0.11
01Jan2000	02:24	0.10	0.011	0.62	0.11
01Jan2000	02:25	0.10	0.011	0.62	0.11
01Jan2000	02:26	0.10	0.011	0.62	0.11
01Jan2000	02:27	0.10	0.011	0.62	0.11
01Jan2000	02:28	0.10	0.011	0.62	0.11
01Jan2000	02:29	0.10	0.011	0.62	0.11

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	02:30	0.10	0.011	0.62	0.11
01Jan2000	02:31	0.10	0.011	0.62	0.11
01Jan2000	02:32	0.10	0.011	0.62	0.11
01Jan2000	02:33	0.10	0.011	0.62	0.11
01Jan2000	02:34	0.10	0.011	0.62	0.11
01Jan2000	02:35	0.10	0.011	0.62	0.11
01Jan2000	02:36	0.10	0.011	0.62	0.11
01Jan2000	02:37	0.12	0.011	0.62	0.11
01Jan2000	02:38	0.13	0.011	0.62	0.11
01Jan2000	02:39	0.15	0.011	0.62	0.11
01Jan2000	02:40	0.17	0.011	0.62	0.11
01Jan2000	02:41	0.18	0.011	0.63	0.11
01Jan2000	02:42	0.20	0.011	0.64	0.11
01Jan2000	02:43	0.20	0.011	0.64	0.11
01Jan2000	02:44	0.20	0.011	0.65	0.11
01Jan2000	02:45	0.20	0.011	0.66	0.11
01Jan2000	02:46	0.20	0.011	0.66	0.11
01Jan2000	02:47	0.20	0.012	0.67	0.11
01Jan2000	02:48	0.20	0.012	0.68	0.11
01Jan2000	02:49	0.20	0.012	0.69	0.11
01Jan2000	02:50	0.20	0.012	0.69	0.11
01Jan2000	02:51	0.20	0.012	0.70	0.11
01Jan2000	02:52	0.20	0.012	0.71	0.11
01Jan2000	02:53	0.20	0.012	0.72	0.11
01Jan2000	02:54	0.20	0.012	0.72	0.11
01Jan2000	02:55	0.20	0.013	0.73	0.11
01Jan2000	02:56	0.20	0.013	0.74	0.11
01Jan2000	02:57	0.20	0.013	0.74	0.11
01Jan2000	02:58	0.20	0.013	0.75	0.11
01Jan2000	02:59	0.20	0.013	0.76	0.11
01Jan2000	03:00	0.20	0.013	0.76	0.12

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	03:01	0.20	0.013	0.77	0.12
01Jan2000	03:02	0.20	0.013	0.77	0.12
01Jan2000	03:03	0.20	0.013	0.78	0.13
01Jan2000	03:04	0.20	0.014	0.78	0.13
01Jan2000	03:05	0.20	0.014	0.78	0.13
01Jan2000	03:06	0.20	0.014	0.79	0.14
01Jan2000	03:07	0.20	0.014	0.79	0.14
01Jan2000	03:08	0.20	0.014	0.80	0.14
01Jan2000	03:09	0.20	0.014	0.80	0.14
01Jan2000	03:10	0.20	0.014	0.80	0.15
01Jan2000	03:11	0.20	0.014	0.81	0.15
01Jan2000	03:12	0.20	0.014	0.81	0.15
01Jan2000	03:13	0.20	0.014	0.81	0.15
01Jan2000	03:14	0.20	0.014	0.82	0.15
01Jan2000	03:15	0.20	0.014	0.82	0.16
01Jan2000	03:16	0.20	0.014	0.82	0.16
01Jan2000	03:17	0.20	0.015	0.82	0.16
01Jan2000	03:18	0.20	0.015	0.83	0.16
01Jan2000	03:19	0.20	0.015	0.83	0.16
01Jan2000	03:20	0.20	0.015	0.83	0.16
01Jan2000	03:21	0.20	0.015	0.83	0.17
01Jan2000	03:22	0.20	0.015	0.83	0.17
01Jan2000	03:23	0.20	0.015	0.84	0.17
01Jan2000	03:24	0.20	0.015	0.84	0.18
01Jan2000	03:25	0.22	0.015	0.84	0.18
01Jan2000	03:26	0.23	0.015	0.84	0.19
01Jan2000	03:27	0.25	0.015	0.85	0.19
01Jan2000	03:28	0.27	0.015	0.85	0.20
01Jan2000	03:29	0.28	0.015	0.86	0.21
01Jan2000	03:30	0.30	0.015	0.86	0.22
01Jan2000	03:31	0.30	0.015	0.87	0.22

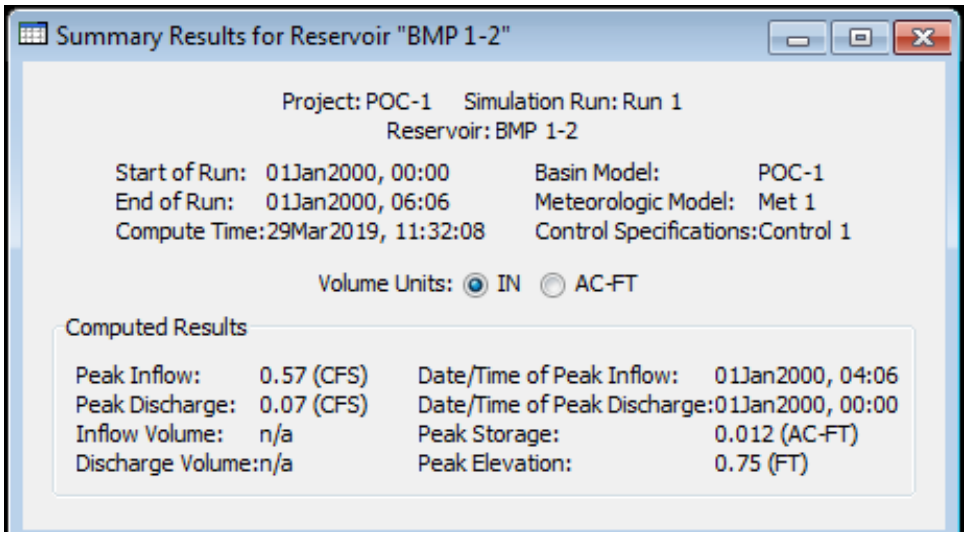
Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	03:32	0.30	0.016	0.87	0.23
01Jan2000	03:33	0.30	0.016	0.88	0.24
01Jan2000	03:34	0.30	0.016	0.88	0.25
01Jan2000	03:35	0.30	0.016	0.88	0.25
01Jan2000	03:36	0.30	0.016	0.89	0.26
01Jan2000	03:37	0.32	0.016	0.89	0.26
01Jan2000	03:38	0.33	0.016	0.89	0.27
01Jan2000	03:39	0.35	0.016	0.90	0.28
01Jan2000	03:40	0.37	0.016	0.90	0.29
01Jan2000	03:41	0.38	0.016	0.91	0.30
01Jan2000	03:42	0.40	0.016	0.92	0.31
01Jan2000	03:43	0.40	0.017	0.92	0.32
01Jan2000	03:44	0.40	0.017	0.93	0.33
01Jan2000	03:45	0.40	0.017	0.93	0.34
01Jan2000	03:46	0.40	0.017	0.93	0.35
01Jan2000	03:47	0.40	0.017	0.94	0.36
01Jan2000	03:48	0.40	0.017	0.94	0.36
01Jan2000	03:49	0.43	0.017	0.94	0.37
01Jan2000	03:50	0.47	0.017	0.95	0.38
01Jan2000	03:51	0.50	0.017	0.95	0.40
01Jan2000	03:52	0.53	0.017	0.96	0.41
01Jan2000	03:53	0.57	0.018	0.97	0.43
01Jan2000	03:54	0.60	0.018	0.98	0.46
01Jan2000	03:55	0.63	0.018	0.99	0.48
01Jan2000	03:56	0.67	0.018	1.00	0.50
01Jan2000	03:57	0.70	0.018	1.01	0.53
01Jan2000	03:58	0.73	0.019	1.02	0.55
01Jan2000	03:59	0.77	0.019	1.03	0.57
01Jan2000	04:00	0.80	0.019	1.04	0.59
01Jan2000	04:01	1.20	0.020	1.06	0.64
01Jan2000	04:02	1.59	0.021	1.11	0.70

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	04:03	1.99	0.022	1.18	0.78
01Jan2000	04:04	2.38	0.024	1.27	0.87
01Jan2000	04:05	2.78	0.026	1.37	0.97
01Jan2000	04:06	3.17	0.029	1.50	1.07
01Jan2000	04:07	2.73	0.032	1.61	1.16
01Jan2000	04:08	2.28	0.033	1.70	1.22
01Jan2000	04:09	1.84	0.035	1.75	1.25
01Jan2000	04:10	1.39	0.035	1.77	1.27
01Jan2000	04:11	0.95	0.035	1.77	1.26
01Jan2000	04:12	0.50	0.034	1.73	1.24
01Jan2000	04:13	0.47	0.033	1.69	1.21
01Jan2000	04:14	0.43	0.032	1.64	1.18
01Jan2000	04:15	0.40	0.031	1.59	1.14
01Jan2000	04:16	0.37	0.030	1.54	1.11
01Jan2000	04:17	0.33	0.029	1.50	1.07
01Jan2000	04:18	0.30	0.028	1.45	1.03
01Jan2000	04:19	0.30	0.027	1.41	1.00
01Jan2000	04:20	0.30	0.026	1.36	0.96
01Jan2000	04:21	0.30	0.025	1.32	0.92
01Jan2000	04:22	0.30	0.024	1.28	0.89
01Jan2000	04:23	0.30	0.024	1.25	0.85
01Jan2000	04:24	0.30	0.023	1.21	0.82
01Jan2000	04:25	0.28	0.022	1.18	0.78
01Jan2000	04:26	0.27	0.021	1.15	0.75
01Jan2000	04:27	0.25	0.021	1.12	0.71
01Jan2000	04:28	0.23	0.020	1.09	0.67
01Jan2000	04:29	0.22	0.020	1.06	0.63
01Jan2000	04:30	0.20	0.019	1.04	0.58
01Jan2000	04:31	0.20	0.019	1.01	0.54
01Jan2000	04:32	0.20	0.018	0.99	0.50
01Jan2000	04:33	0.20	0.018	0.98	0.46

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	04:34	0.20	0.017	0.96	0.42
01Jan2000	04:35	0.20	0.017	0.95	0.39
01Jan2000	04:36	0.20	0.017	0.94	0.36
01Jan2000	04:37	0.20	0.017	0.93	0.34
01Jan2000	04:38	0.20	0.017	0.92	0.32
01Jan2000	04:39	0.20	0.016	0.92	0.30
01Jan2000	04:40	0.20	0.016	0.91	0.29
01Jan2000	04:41	0.20	0.016	0.90	0.28
01Jan2000	04:42	0.20	0.016	0.90	0.27
01Jan2000	04:43	0.20	0.016	0.89	0.27
01Jan2000	04:44	0.20	0.016	0.89	0.26
01Jan2000	04:45	0.20	0.016	0.88	0.25
01Jan2000	04:46	0.20	0.016	0.88	0.25
01Jan2000	04:47	0.20	0.016	0.88	0.24
01Jan2000	04:48	0.20	0.016	0.87	0.24
01Jan2000	04:49	0.18	0.016	0.87	0.23
01Jan2000	04:50	0.17	0.015	0.87	0.23
01Jan2000	04:51	0.15	0.015	0.86	0.22
01Jan2000	04:52	0.13	0.015	0.86	0.21
01Jan2000	04:53	0.12	0.015	0.85	0.20
01Jan2000	04:54	0.10	0.015	0.85	0.19
01Jan2000	04:55	0.10	0.015	0.84	0.18
01Jan2000	04:56	0.10	0.015	0.84	0.17
01Jan2000	04:57	0.10	0.015	0.83	0.17
01Jan2000	04:58	0.10	0.015	0.83	0.16
01Jan2000	04:59	0.10	0.015	0.82	0.16
01Jan2000	05:00	0.10	0.014	0.82	0.16
01Jan2000	05:01	0.10	0.014	0.82	0.15
01Jan2000	05:02	0.10	0.014	0.81	0.15
01Jan2000	05:03	0.10	0.014	0.81	0.15
01Jan2000	05:04	0.10	0.014	0.81	0.15

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	05:05	0.10	0.014	0.80	0.15
01Jan2000	05:06	0.10	0.014	0.80	0.14
01Jan2000	05:07	0.10	0.014	0.80	0.14
01Jan2000	05:08	0.10	0.014	0.80	0.14
01Jan2000	05:09	0.10	0.014	0.79	0.14
01Jan2000	05:10	0.10	0.014	0.79	0.14
01Jan2000	05:11	0.10	0.014	0.79	0.14
01Jan2000	05:12	0.10	0.014	0.79	0.13
01Jan2000	05:13	0.10	0.014	0.78	0.13
01Jan2000	05:14	0.10	0.014	0.78	0.13
01Jan2000	05:15	0.10	0.014	0.78	0.13
01Jan2000	05:16	0.10	0.014	0.78	0.13
01Jan2000	05:17	0.10	0.014	0.78	0.13
01Jan2000	05:18	0.10	0.013	0.78	0.13
01Jan2000	05:19	0.10	0.013	0.77	0.13
01Jan2000	05:20	0.10	0.013	0.77	0.12
01Jan2000	05:21	0.10	0.013	0.77	0.12
01Jan2000	05:22	0.10	0.013	0.77	0.12
01Jan2000	05:23	0.10	0.013	0.77	0.12
01Jan2000	05:24	0.10	0.013	0.77	0.12
01Jan2000	05:25	0.10	0.013	0.77	0.12
01Jan2000	05:26	0.10	0.013	0.76	0.12
01Jan2000	05:27	0.10	0.013	0.76	0.12
01Jan2000	05:28	0.10	0.013	0.76	0.12
01Jan2000	05:29	0.10	0.013	0.76	0.12
01Jan2000	05:30	0.10	0.013	0.76	0.12
01Jan2000	05:31	0.10	0.013	0.76	0.12
01Jan2000	05:32	0.10	0.013	0.76	0.11
01Jan2000	05:33	0.10	0.013	0.76	0.11
01Jan2000	05:34	0.10	0.013	0.76	0.11
01Jan2000	05:35	0.10	0.013	0.76	0.11

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	05:36	0.10	0.013	0.76	0.11
01Jan2000	05:37	0.10	0.013	0.75	0.11
01Jan2000	05:38	0.10	0.013	0.75	0.11
01Jan2000	05:39	0.10	0.013	0.75	0.11
01Jan2000	05:40	0.10	0.013	0.75	0.11
01Jan2000	05:41	0.10	0.013	0.75	0.11
01Jan2000	05:42	0.10	0.013	0.75	0.11
01Jan2000	05:43	0.10	0.013	0.75	0.11
01Jan2000	05:44	0.10	0.013	0.75	0.11
01Jan2000	05:45	0.10	0.013	0.75	0.11
01Jan2000	05:46	0.10	0.013	0.75	0.11
01Jan2000	05:47	0.10	0.013	0.75	0.11
01Jan2000	05:48	0.10	0.013	0.75	0.11
01Jan2000	05:49	0.10	0.013	0.75	0.11
01Jan2000	05:50	0.10	0.013	0.75	0.11
01Jan2000	05:51	0.10	0.013	0.75	0.11
01Jan2000	05:52	0.10	0.013	0.74	0.11
01Jan2000	05:53	0.10	0.013	0.74	0.11
01Jan2000	05:54	0.10	0.013	0.74	0.11
01Jan2000	05:55	0.10	0.013	0.74	0.11
01Jan2000	05:56	0.10	0.013	0.74	0.11
01Jan2000	05:57	0.10	0.013	0.74	0.11
01Jan2000	05:58	0.10	0.013	0.74	0.11
01Jan2000	05:59	0.10	0.013	0.74	0.11
01Jan2000	06:00	0.10	0.013	0.74	0.11
01Jan2000	06:01	0.08	0.013	0.74	0.11
01Jan2000	06:02	0.07	0.013	0.73	0.11
01Jan2000	06:03	0.05	0.013	0.73	0.11
01Jan2000	06:04	0.03	0.012	0.73	0.11
01Jan2000	06:05	0.02	0.012	0.72	0.11
01Jan2000	06:06	0.00	0.012	0.71	0.11


Summary Results for Reservoir "BMP 1-2"
Project: POC-1 Simulation Run: Run 1
Reservoir: BMP 1-2
Start of Run: 01Jan2000, 00:00
End of Run: 01Jan2000, 06:06
Compute Time: 29Mar2019, 11:32:08
Basin Model: POC-1
Meteorologic Model: Met 1
Control Specifications: Control 1
Volume Units: IN AC-FT
Computed Results
Peak Inflow: 0.57 (CFS)
Peak Discharge: 0.07 (CFS)
Inflow Volume: n/a
Discharge Volume: n/a
Date/Time of Peak Inflow: 01Jan2000, 04:06
Date/Time of Peak Discharge: 01Jan2000, 00:00
Peak Storage: 0.012 (AC-FT)
Peak Elevation: 0.75 (FT)

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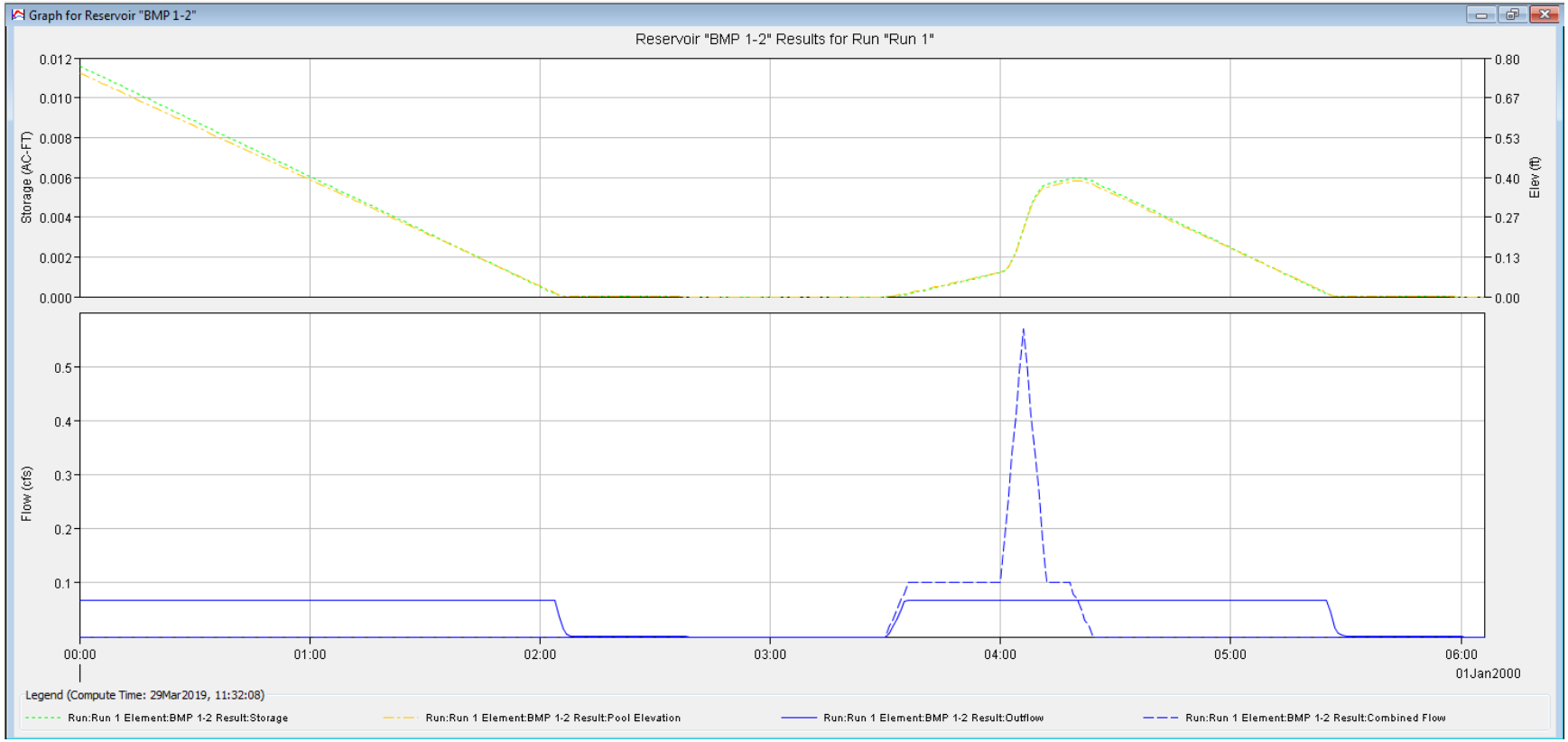
Graph for Reservoir "BMP 1-2"
Reservoir "BMP 1-2" Results for Run "Run 1"
Storage (AC-FT)
0.012
0.010
0.008
0.006
0.004
0.002
0.000
Elev (ft)
0.80
0.67
0.53
0.40
0.27
0.13
0.00
Flow (cfs)
0.5
0.4
0.3
0.2
0.1
00:00
01:00
02:00
03:00
04:00
05:00
06:00
01Jan2000
Legend (Compute Time: 29Mar2019, 11:32:08)
Run:Run 1 Element:BMP 1-2 Result:Storage
Run:Run 1 Element:BMP 1-2 Result:Pool Elevation
Run:Run 1 Element:BMP 1-2 Result:Outflow
Run:Run 1 Element:BMP 1-2 Result:Combined Flow

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Project: POC-1 Simulation Run: Run 1
Reservoir: BMP 1-2

Start of Run: 01Jan2000, 00:00 Basin Model: POC-1
End of Run: 01Jan2000, 06:06 Meteorologic Model: Met 1
Compute Time: 29Mar2019, 11:43:02 Control Specifications: Control 1

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	00:00	0.00	0.012	0.75	0.07
01Jan2000	00:01	0.00	0.012	0.74	0.07
01Jan2000	00:02	0.00	0.011	0.74	0.07
01Jan2000	00:03	0.00	0.011	0.73	0.07
01Jan2000	00:04	0.00	0.011	0.73	0.07
01Jan2000	00:05	0.00	0.011	0.72	0.07
01Jan2000	00:06	0.00	0.011	0.71	0.07
01Jan2000	00:07	0.00	0.011	0.71	0.07
01Jan2000	00:08	0.00	0.011	0.70	0.07
01Jan2000	00:09	0.00	0.011	0.70	0.07
01Jan2000	00:10	0.00	0.011	0.69	0.07
01Jan2000	00:11	0.00	0.011	0.68	0.07
01Jan2000	00:12	0.00	0.010	0.68	0.07
01Jan2000	00:13	0.00	0.010	0.67	0.07
01Jan2000	00:14	0.00	0.010	0.67	0.07
01Jan2000	00:15	0.00	0.010	0.66	0.07
01Jan2000	00:16	0.00	0.010	0.65	0.07
01Jan2000	00:17	0.00	0.010	0.65	0.07
01Jan2000	00:18	0.00	0.010	0.64	0.07
01Jan2000	00:19	0.00	0.010	0.64	0.07
01Jan2000	00:20	0.00	0.010	0.63	0.07
01Jan2000	00:21	0.00	0.010	0.62	0.07
01Jan2000	00:22	0.00	0.010	0.62	0.07
01Jan2000	00:23	0.00	0.009	0.61	0.07
01Jan2000	00:24	0.00	0.009	0.61	0.07
01Jan2000	00:25	0.00	0.009	0.60	0.07

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	00:26	0.00	0.009	0.60	0.07
01Jan2000	00:27	0.00	0.009	0.59	0.07
01Jan2000	00:28	0.00	0.009	0.58	0.07
01Jan2000	00:29	0.00	0.009	0.58	0.07
01Jan2000	00:30	0.00	0.009	0.57	0.07
01Jan2000	00:31	0.00	0.009	0.57	0.07
01Jan2000	00:32	0.00	0.009	0.56	0.07
01Jan2000	00:33	0.00	0.009	0.55	0.07
01Jan2000	00:34	0.00	0.008	0.55	0.07
01Jan2000	00:35	0.00	0.008	0.54	0.07
01Jan2000	00:36	0.00	0.008	0.54	0.07
01Jan2000	00:37	0.00	0.008	0.53	0.07
01Jan2000	00:38	0.00	0.008	0.52	0.07
01Jan2000	00:39	0.00	0.008	0.52	0.07
01Jan2000	00:40	0.00	0.008	0.51	0.07
01Jan2000	00:41	0.00	0.008	0.51	0.07
01Jan2000	00:42	0.00	0.008	0.50	0.07
01Jan2000	00:43	0.00	0.008	0.49	0.07
01Jan2000	00:44	0.00	0.008	0.49	0.07
01Jan2000	00:45	0.00	0.007	0.48	0.07
01Jan2000	00:46	0.00	0.007	0.48	0.07
01Jan2000	00:47	0.00	0.007	0.47	0.07
01Jan2000	00:48	0.00	0.007	0.46	0.07
01Jan2000	00:49	0.00	0.007	0.46	0.07
01Jan2000	00:50	0.00	0.007	0.45	0.07
01Jan2000	00:51	0.00	0.007	0.45	0.07
01Jan2000	00:52	0.00	0.007	0.44	0.07
01Jan2000	00:53	0.00	0.007	0.43	0.07
01Jan2000	00:54	0.00	0.007	0.43	0.07
01Jan2000	00:55	0.00	0.007	0.42	0.07
01Jan2000	00:56	0.00	0.006	0.42	0.07

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	00:57	0.00	0.006	0.41	0.07
01Jan2000	00:58	0.00	0.006	0.40	0.07
01Jan2000	00:59	0.00	0.006	0.40	0.07
01Jan2000	01:00	0.00	0.006	0.39	0.07
01Jan2000	01:01	0.00	0.006	0.39	0.07
01Jan2000	01:02	0.00	0.006	0.38	0.07
01Jan2000	01:03	0.00	0.006	0.37	0.07
01Jan2000	01:04	0.00	0.006	0.37	0.07
01Jan2000	01:05	0.00	0.006	0.36	0.07
01Jan2000	01:06	0.00	0.005	0.36	0.07
01Jan2000	01:07	0.00	0.005	0.35	0.07
01Jan2000	01:08	0.00	0.005	0.35	0.07
01Jan2000	01:09	0.00	0.005	0.34	0.07
01Jan2000	01:10	0.00	0.005	0.33	0.07
01Jan2000	01:11	0.00	0.005	0.33	0.07
01Jan2000	01:12	0.00	0.005	0.32	0.07
01Jan2000	01:13	0.00	0.005	0.32	0.07
01Jan2000	01:14	0.00	0.005	0.31	0.07
01Jan2000	01:15	0.00	0.005	0.30	0.07
01Jan2000	01:16	0.00	0.005	0.30	0.07
01Jan2000	01:17	0.00	0.004	0.29	0.07
01Jan2000	01:18	0.00	0.004	0.29	0.07
01Jan2000	01:19	0.00	0.004	0.28	0.07
01Jan2000	01:20	0.00	0.004	0.27	0.07
01Jan2000	01:21	0.00	0.004	0.27	0.07
01Jan2000	01:22	0.00	0.004	0.26	0.07
01Jan2000	01:23	0.00	0.004	0.26	0.07
01Jan2000	01:24	0.00	0.004	0.25	0.07
01Jan2000	01:25	0.00	0.004	0.24	0.07
01Jan2000	01:26	0.00	0.004	0.24	0.07
01Jan2000	01:27	0.00	0.004	0.23	0.07

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	01:28	0.00	0.003	0.23	0.07
01Jan2000	01:29	0.00	0.003	0.22	0.07
01Jan2000	01:30	0.00	0.003	0.21	0.07
01Jan2000	01:31	0.00	0.003	0.21	0.07
01Jan2000	01:32	0.00	0.003	0.20	0.07
01Jan2000	01:33	0.00	0.003	0.20	0.07
01Jan2000	01:34	0.00	0.003	0.19	0.07
01Jan2000	01:35	0.00	0.003	0.18	0.07
01Jan2000	01:36	0.00	0.003	0.18	0.07
01Jan2000	01:37	0.00	0.003	0.17	0.07
01Jan2000	01:38	0.00	0.003	0.17	0.07
01Jan2000	01:39	0.00	0.002	0.16	0.07
01Jan2000	01:40	0.00	0.002	0.15	0.07
01Jan2000	01:41	0.00	0.002	0.15	0.07
01Jan2000	01:42	0.00	0.002	0.14	0.07
01Jan2000	01:43	0.00	0.002	0.14	0.07
01Jan2000	01:44	0.00	0.002	0.13	0.07
01Jan2000	01:45	0.00	0.002	0.12	0.07
01Jan2000	01:46	0.00	0.002	0.12	0.07
01Jan2000	01:47	0.00	0.002	0.11	0.07
01Jan2000	01:48	0.00	0.002	0.11	0.07
01Jan2000	01:49	0.00	0.002	0.10	0.07
01Jan2000	01:50	0.00	0.001	0.10	0.07
01Jan2000	01:51	0.00	0.001	0.09	0.07
01Jan2000	01:52	0.00	0.001	0.08	0.07
01Jan2000	01:53	0.00	0.001	0.08	0.07
01Jan2000	01:54	0.00	0.001	0.07	0.07
01Jan2000	01:55	0.00	0.001	0.07	0.07
01Jan2000	01:56	0.00	0.001	0.06	0.07
01Jan2000	01:57	0.00	0.001	0.05	0.07
01Jan2000	01:58	0.00	0.001	0.05	0.07

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	01:59	0.00	0.001	0.04	0.07
01Jan2000	02:00	0.00	0.000	0.04	0.07
01Jan2000	02:01	0.00	0.000	0.03	0.07
01Jan2000	02:02	0.00	0.000	0.02	0.07
01Jan2000	02:03	0.00	0.000	0.02	0.07
01Jan2000	02:04	0.00	0.000	0.01	0.07
01Jan2000	02:05	0.00	0.000	0.01	0.04
01Jan2000	02:06	0.00	0.000	0.00	0.01
01Jan2000	02:07	0.00	0.000	0.00	0.01
01Jan2000	02:08	0.00	0.000	0.00	0.00
01Jan2000	02:09	0.00	0.000	0.00	0.00
01Jan2000	02:10	0.00	0.000	0.00	0.00
01Jan2000	02:11	0.00	0.000	0.00	0.00
01Jan2000	02:12	0.00	0.000	0.00	0.00
01Jan2000	02:13	0.00	0.000	0.00	0.00
01Jan2000	02:14	0.00	0.000	0.00	0.00
01Jan2000	02:15	0.00	0.000	0.00	0.00
01Jan2000	02:16	0.00	0.000	0.00	0.00
01Jan2000	02:17	0.00	0.000	0.00	0.00
01Jan2000	02:18	0.00	0.000	0.00	0.00
01Jan2000	02:19	0.00	0.000	0.00	0.00
01Jan2000	02:20	0.00	0.000	0.00	0.00
01Jan2000	02:21	0.00	0.000	0.00	0.00
01Jan2000	02:22	0.00	0.000	0.00	0.00
01Jan2000	02:23	0.00	0.000	0.00	0.00
01Jan2000	02:24	0.00	0.000	0.00	0.00
01Jan2000	02:25	0.00	0.000	0.00	0.00
01Jan2000	02:26	0.00	0.000	0.00	0.00
01Jan2000	02:27	0.00	0.000	0.00	0.00
01Jan2000	02:28	0.00	0.000	0.00	0.00
01Jan2000	02:29	0.00	0.000	0.00	0.00

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	02:30	0.00	0.000	0.00	0.00
01Jan2000	02:31	0.00	0.000	0.00	0.00
01Jan2000	02:32	0.00	0.000	0.00	0.00
01Jan2000	02:33	0.00	0.000	0.00	0.00
01Jan2000	02:34	0.00	0.000	0.00	0.00
01Jan2000	02:35	0.00	0.000	0.00	0.00
01Jan2000	02:36	0.00	0.000	0.00	0.00
01Jan2000	02:37	0.00	0.000	0.00	0.00
01Jan2000	02:38	0.00	0.000	0.00	0.00
01Jan2000	02:39	0.00	0.000	0.00	0.00
01Jan2000	02:40	0.00	0.000	0.00	0.00
01Jan2000	02:41	0.00	0.000	0.00	0.00
01Jan2000	02:42	0.00	0.000	0.00	0.00
01Jan2000	02:43	0.00	0.000	0.00	0.00
01Jan2000	02:44	0.00	0.000	0.00	0.00
01Jan2000	02:45	0.00	0.000	0.00	0.00
01Jan2000	02:46	0.00	0.000	0.00	0.00
01Jan2000	02:47	0.00	0.000	0.00	0.00
01Jan2000	02:48	0.00	0.000	0.00	0.00
01Jan2000	02:49	0.00	0.000	0.00	0.00
01Jan2000	02:50	0.00	0.000	0.00	0.00
01Jan2000	02:51	0.00	0.000	0.00	0.00
01Jan2000	02:52	0.00	0.000	0.00	0.00
01Jan2000	02:53	0.00	0.000	0.00	0.00
01Jan2000	02:54	0.00	0.000	0.00	0.00
01Jan2000	02:55	0.00	0.000	0.00	0.00
01Jan2000	02:56	0.00	0.000	0.00	0.00
01Jan2000	02:57	0.00	0.000	0.00	0.00
01Jan2000	02:58	0.00	0.000	0.00	0.00
01Jan2000	02:59	0.00	0.000	0.00	0.00
01Jan2000	03:00	0.00	0.000	0.00	0.00

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	03:01	0.00	0.000	0.00	0.00
01Jan2000	03:02	0.00	0.000	0.00	0.00
01Jan2000	03:03	0.00	0.000	0.00	0.00
01Jan2000	03:04	0.00	0.000	0.00	0.00
01Jan2000	03:05	0.00	0.000	0.00	0.00
01Jan2000	03:06	0.00	0.000	0.00	0.00
01Jan2000	03:07	0.00	0.000	0.00	0.00
01Jan2000	03:08	0.00	0.000	0.00	0.00
01Jan2000	03:09	0.00	0.000	0.00	0.00
01Jan2000	03:10	0.00	0.000	0.00	0.00
01Jan2000	03:11	0.00	0.000	0.00	0.00
01Jan2000	03:12	0.00	0.000	0.00	0.00
01Jan2000	03:13	0.00	0.000	0.00	0.00
01Jan2000	03:14	0.00	0.000	0.00	0.00
01Jan2000	03:15	0.00	0.000	0.00	0.00
01Jan2000	03:16	0.00	0.000	0.00	0.00
01Jan2000	03:17	0.00	0.000	0.00	0.00
01Jan2000	03:18	0.00	0.000	0.00	0.00
01Jan2000	03:19	0.00	0.000	0.00	0.00
01Jan2000	03:20	0.00	0.000	0.00	0.00
01Jan2000	03:21	0.00	0.000	0.00	0.00
01Jan2000	03:22	0.00	0.000	0.00	0.00
01Jan2000	03:23	0.00	0.000	0.00	0.00
01Jan2000	03:24	0.00	0.000	0.00	0.00
01Jan2000	03:25	0.00	0.000	0.00	0.00
01Jan2000	03:26	0.00	0.000	0.00	0.00
01Jan2000	03:27	0.00	0.000	0.00	0.00
01Jan2000	03:28	0.00	0.000	0.00	0.00
01Jan2000	03:29	0.00	0.000	0.00	0.00
01Jan2000	03:30	0.00	0.000	0.00	0.00
01Jan2000	03:31	0.02	0.000	0.00	0.01

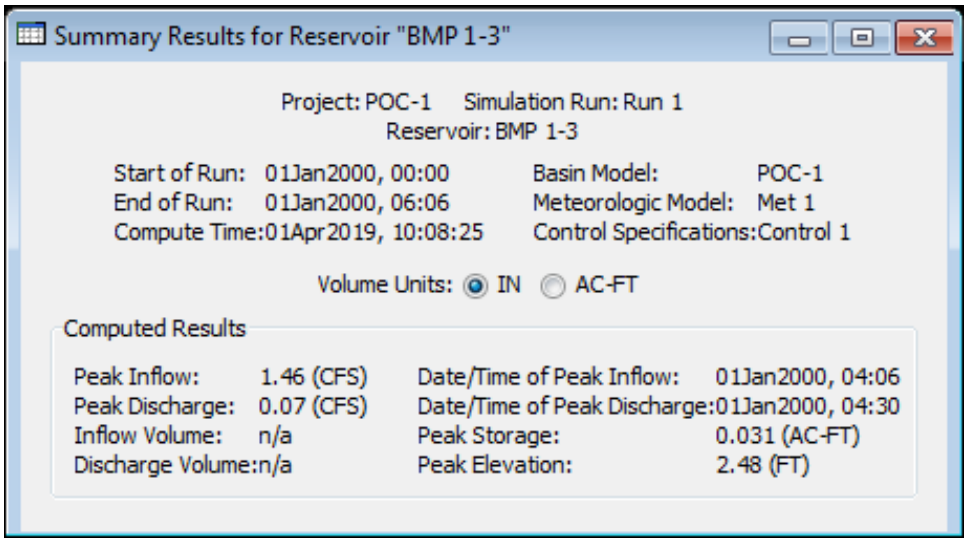
Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	03:32	0.03	0.000	0.00	0.02
01Jan2000	03:33	0.05	0.000	0.00	0.03
01Jan2000	03:34	0.07	0.000	0.01	0.05
01Jan2000	03:35	0.08	0.000	0.01	0.07
01Jan2000	03:36	0.10	0.000	0.01	0.07
01Jan2000	03:37	0.10	0.000	0.01	0.07
01Jan2000	03:38	0.10	0.000	0.02	0.07
01Jan2000	03:39	0.10	0.000	0.02	0.07
01Jan2000	03:40	0.10	0.000	0.02	0.07
01Jan2000	03:41	0.10	0.000	0.03	0.07
01Jan2000	03:42	0.10	0.000	0.03	0.07
01Jan2000	03:43	0.10	0.000	0.03	0.07
01Jan2000	03:44	0.10	0.000	0.04	0.07
01Jan2000	03:45	0.10	0.001	0.04	0.07
01Jan2000	03:46	0.10	0.001	0.04	0.07
01Jan2000	03:47	0.10	0.001	0.04	0.07
01Jan2000	03:48	0.10	0.001	0.05	0.07
01Jan2000	03:49	0.10	0.001	0.05	0.07
01Jan2000	03:50	0.10	0.001	0.05	0.07
01Jan2000	03:51	0.10	0.001	0.06	0.07
01Jan2000	03:52	0.10	0.001	0.06	0.07
01Jan2000	03:53	0.10	0.001	0.06	0.07
01Jan2000	03:54	0.10	0.001	0.06	0.07
01Jan2000	03:55	0.10	0.001	0.07	0.07
01Jan2000	03:56	0.10	0.001	0.07	0.07
01Jan2000	03:57	0.10	0.001	0.07	0.07
01Jan2000	03:58	0.10	0.001	0.08	0.07
01Jan2000	03:59	0.10	0.001	0.08	0.07
01Jan2000	04:00	0.10	0.001	0.08	0.07
01Jan2000	04:01	0.18	0.001	0.09	0.07
01Jan2000	04:02	0.26	0.002	0.10	0.07

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	04:03	0.34	0.002	0.12	0.07
01Jan2000	04:04	0.41	0.002	0.15	0.07
01Jan2000	04:05	0.49	0.003	0.18	0.07
01Jan2000	04:06	0.57	0.003	0.22	0.07
01Jan2000	04:07	0.49	0.004	0.27	0.07
01Jan2000	04:08	0.41	0.005	0.30	0.07
01Jan2000	04:09	0.34	0.005	0.33	0.07
01Jan2000	04:10	0.26	0.005	0.35	0.07
01Jan2000	04:11	0.18	0.006	0.36	0.07
01Jan2000	04:12	0.10	0.006	0.37	0.07
01Jan2000	04:13	0.10	0.006	0.37	0.07
01Jan2000	04:14	0.10	0.006	0.37	0.07
01Jan2000	04:15	0.10	0.006	0.38	0.07
01Jan2000	04:16	0.10	0.006	0.38	0.07
01Jan2000	04:17	0.10	0.006	0.38	0.07
01Jan2000	04:18	0.10	0.006	0.39	0.07
01Jan2000	04:19	0.08	0.006	0.39	0.07
01Jan2000	04:20	0.07	0.006	0.39	0.07
01Jan2000	04:21	0.05	0.006	0.39	0.07
01Jan2000	04:22	0.03	0.006	0.38	0.07
01Jan2000	04:23	0.02	0.006	0.38	0.07
01Jan2000	04:24	0.00	0.006	0.38	0.07
01Jan2000	04:25	0.00	0.006	0.37	0.07
01Jan2000	04:26	0.00	0.006	0.36	0.07
01Jan2000	04:27	0.00	0.006	0.36	0.07
01Jan2000	04:28	0.00	0.005	0.35	0.07
01Jan2000	04:29	0.00	0.005	0.35	0.07
01Jan2000	04:30	0.00	0.005	0.34	0.07
01Jan2000	04:31	0.00	0.005	0.33	0.07
01Jan2000	04:32	0.00	0.005	0.33	0.07
01Jan2000	04:33	0.00	0.005	0.32	0.07

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	04:34	0.00	0.005	0.32	0.07
01Jan2000	04:35	0.00	0.005	0.31	0.07
01Jan2000	04:36	0.00	0.005	0.30	0.07
01Jan2000	04:37	0.00	0.005	0.30	0.07
01Jan2000	04:38	0.00	0.004	0.29	0.07
01Jan2000	04:39	0.00	0.004	0.29	0.07
01Jan2000	04:40	0.00	0.004	0.28	0.07
01Jan2000	04:41	0.00	0.004	0.27	0.07
01Jan2000	04:42	0.00	0.004	0.27	0.07
01Jan2000	04:43	0.00	0.004	0.26	0.07
01Jan2000	04:44	0.00	0.004	0.26	0.07
01Jan2000	04:45	0.00	0.004	0.25	0.07
01Jan2000	04:46	0.00	0.004	0.25	0.07
01Jan2000	04:47	0.00	0.004	0.24	0.07
01Jan2000	04:48	0.00	0.004	0.23	0.07
01Jan2000	04:49	0.00	0.003	0.23	0.07
01Jan2000	04:50	0.00	0.003	0.22	0.07
01Jan2000	04:51	0.00	0.003	0.22	0.07
01Jan2000	04:52	0.00	0.003	0.21	0.07
01Jan2000	04:53	0.00	0.003	0.20	0.07
01Jan2000	04:54	0.00	0.003	0.20	0.07
01Jan2000	04:55	0.00	0.003	0.19	0.07
01Jan2000	04:56	0.00	0.003	0.19	0.07
01Jan2000	04:57	0.00	0.003	0.18	0.07
01Jan2000	04:58	0.00	0.003	0.17	0.07
01Jan2000	04:59	0.00	0.003	0.17	0.07
01Jan2000	05:00	0.00	0.002	0.16	0.07
01Jan2000	05:01	0.00	0.002	0.16	0.07
01Jan2000	05:02	0.00	0.002	0.15	0.07
01Jan2000	05:03	0.00	0.002	0.14	0.07
01Jan2000	05:04	0.00	0.002	0.14	0.07

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	05:05	0.00	0.002	0.13	0.07
01Jan2000	05:06	0.00	0.002	0.13	0.07
01Jan2000	05:07	0.00	0.002	0.12	0.07
01Jan2000	05:08	0.00	0.002	0.11	0.07
01Jan2000	05:09	0.00	0.002	0.11	0.07
01Jan2000	05:10	0.00	0.002	0.10	0.07
01Jan2000	05:11	0.00	0.001	0.10	0.07
01Jan2000	05:12	0.00	0.001	0.09	0.07
01Jan2000	05:13	0.00	0.001	0.08	0.07
01Jan2000	05:14	0.00	0.001	0.08	0.07
01Jan2000	05:15	0.00	0.001	0.07	0.07
01Jan2000	05:16	0.00	0.001	0.07	0.07
01Jan2000	05:17	0.00	0.001	0.06	0.07
01Jan2000	05:18	0.00	0.001	0.05	0.07
01Jan2000	05:19	0.00	0.001	0.05	0.07
01Jan2000	05:20	0.00	0.001	0.04	0.07
01Jan2000	05:21	0.00	0.001	0.04	0.07
01Jan2000	05:22	0.00	0.000	0.03	0.07
01Jan2000	05:23	0.00	0.000	0.02	0.07
01Jan2000	05:24	0.00	0.000	0.02	0.07
01Jan2000	05:25	0.00	0.000	0.01	0.07
01Jan2000	05:26	0.00	0.000	0.01	0.05
01Jan2000	05:27	0.00	0.000	0.00	0.02
01Jan2000	05:28	0.00	0.000	0.00	0.01
01Jan2000	05:29	0.00	0.000	0.00	0.00
01Jan2000	05:30	0.00	0.000	0.00	0.00
01Jan2000	05:31	0.00	0.000	0.00	0.00
01Jan2000	05:32	0.00	0.000	0.00	0.00
01Jan2000	05:33	0.00	0.000	0.00	0.00
01Jan2000	05:34	0.00	0.000	0.00	0.00
01Jan2000	05:35	0.00	0.000	0.00	0.00

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	05:36	0.00	0.000	0.00	0.00
01Jan2000	05:37	0.00	0.000	0.00	0.00
01Jan2000	05:38	0.00	0.000	0.00	0.00
01Jan2000	05:39	0.00	0.000	0.00	0.00
01Jan2000	05:40	0.00	0.000	0.00	0.00
01Jan2000	05:41	0.00	0.000	0.00	0.00
01Jan2000	05:42	0.00	0.000	0.00	0.00
01Jan2000	05:43	0.00	0.000	0.00	0.00
01Jan2000	05:44	0.00	0.000	0.00	0.00
01Jan2000	05:45	0.00	0.000	0.00	0.00
01Jan2000	05:46	0.00	0.000	0.00	0.00
01Jan2000	05:47	0.00	0.000	0.00	0.00
01Jan2000	05:48	0.00	0.000	0.00	0.00
01Jan2000	05:49	0.00	0.000	0.00	0.00
01Jan2000	05:50	0.00	0.000	0.00	0.00
01Jan2000	05:51	0.00	0.000	0.00	0.00
01Jan2000	05:52	0.00	0.000	0.00	0.00
01Jan2000	05:53	0.00	0.000	0.00	0.00
01Jan2000	05:54	0.00	0.000	0.00	0.00
01Jan2000	05:55	0.00	0.000	0.00	0.00
01Jan2000	05:56	0.00	0.000	0.00	0.00
01Jan2000	05:57	0.00	0.000	0.00	0.00
01Jan2000	05:58	0.00	0.000	0.00	0.00
01Jan2000	05:59	0.00	0.000	0.00	0.00
01Jan2000	06:00	0.00	0.000	0.00	0.00
01Jan2000	06:01	0.00	0.000	0.00	0.00
01Jan2000	06:02	0.00	0.000	0.00	0.00
01Jan2000	06:03	0.00	0.000	0.00	0.00
01Jan2000	06:04	0.00	0.000	0.00	0.00
01Jan2000	06:05	0.00	0.000	0.00	0.00
01Jan2000	06:06	0.00	0.000	0.00	0.00


Summary Results for Reservoir "BMP 1-3"
Project: POC-1 Simulation Run: Run 1
Reservoir: BMP 1-3
Start of Run: 01Jan2000, 00:00
End of Run: 01Jan2000, 06:06
Compute Time: 01Apr2019, 10:08:25
Basin Model: POC-1
Meteorologic Model: Met 1
Control Specifications: Control 1
Volume Units: IN AC-FT
Computed Results
Peak Inflow: 1.46 (CFS)
Peak Discharge: 0.07 (CFS)
Inflow Volume: n/a
Discharge Volume: n/a
Date/Time of Peak Inflow: 01Jan2000, 04:06
Date/Time of Peak Discharge: 01Jan2000, 04:30
Peak Storage: 0.031 (AC-FT)
Peak Elevation: 2.48 (FT)

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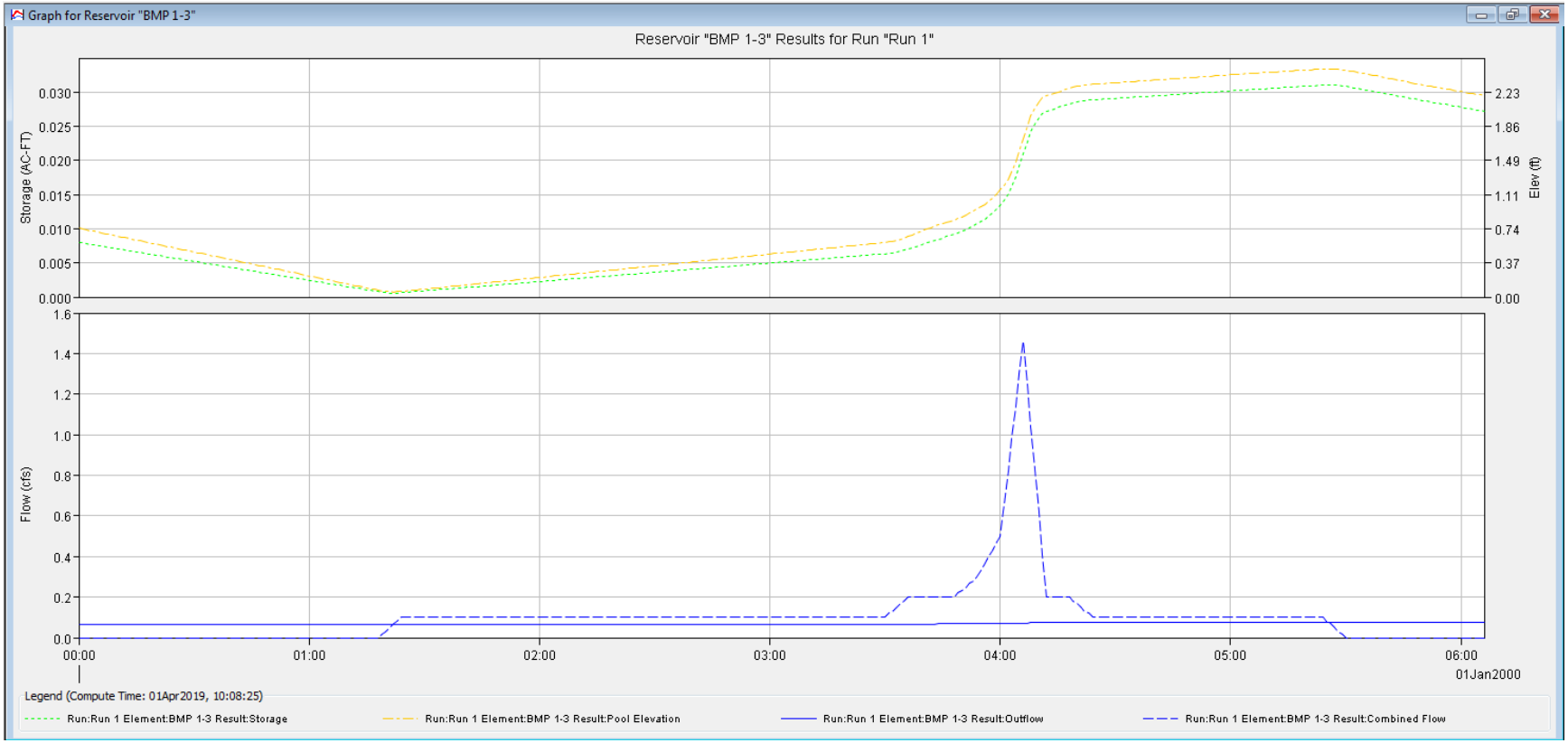
Graph for Reservoir "BMP 1-3"
Reservoir "BMP 1-3" Results for Run "Run 1"
Storage (AC-FT)
0.030
0.025
0.020
0.015
0.010
0.005
0.000
Elev (ft)
2.23
1.86
1.49
1.11
0.74
0.37
0.00
Flow (cfs)
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
00:00
01:00
02:00
03:00
04:00
05:00
06:00
01Jan2000
Legend (Compute Time: 01Apr2019, 10:08:25)
Run:Run 1 Element:BMP 1-3 Result:Storage
Run:Run 1 Element:BMP 1-3 Result:Pool Elevation
Run:Run 1 Element:BMP 1-3 Result:Outflow
Run:Run 1 Element:BMP 1-3 Result:Combined Flow

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Project: POC-1 Simulation Run: Run 1
Reservoir: BMP 1-3

Start of Run: 01Jan2000, 00:00 Basin Model: POC-1
End of Run: 01Jan2000, 06:06 Meteorologic Model: Met 1
Compute Time: 29Mar2019, 11:43:02 Control Specifications: Control 1

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	00:00	0.00	0.008	0.75	0.07
01Jan2000	00:01	0.00	0.008	0.74	0.07
01Jan2000	00:02	0.00	0.008	0.73	0.07
01Jan2000	00:03	0.00	0.008	0.72	0.07
01Jan2000	00:04	0.00	0.008	0.72	0.07
01Jan2000	00:05	0.00	0.008	0.71	0.07
01Jan2000	00:06	0.00	0.007	0.70	0.07
01Jan2000	00:07	0.00	0.007	0.69	0.07
01Jan2000	00:08	0.00	0.007	0.68	0.07
01Jan2000	00:09	0.00	0.007	0.67	0.07
01Jan2000	00:10	0.00	0.007	0.66	0.07
01Jan2000	00:11	0.00	0.007	0.65	0.07
01Jan2000	00:12	0.00	0.007	0.65	0.07
01Jan2000	00:13	0.00	0.007	0.64	0.07
01Jan2000	00:14	0.00	0.007	0.63	0.07
01Jan2000	00:15	0.00	0.007	0.62	0.07
01Jan2000	00:16	0.00	0.007	0.61	0.07
01Jan2000	00:17	0.00	0.006	0.60	0.07
01Jan2000	00:18	0.00	0.006	0.59	0.07
01Jan2000	00:19	0.00	0.006	0.59	0.07
01Jan2000	00:20	0.00	0.006	0.58	0.07
01Jan2000	00:21	0.00	0.006	0.57	0.07
01Jan2000	00:22	0.00	0.006	0.56	0.07
01Jan2000	00:23	0.00	0.006	0.55	0.07
01Jan2000	00:24	0.00	0.006	0.54	0.07
01Jan2000	00:25	0.00	0.006	0.53	0.07

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	00:26	0.00	0.006	0.52	0.07
01Jan2000	00:27	0.00	0.006	0.52	0.07
01Jan2000	00:28	0.00	0.005	0.51	0.07
01Jan2000	00:29	0.00	0.005	0.50	0.07
01Jan2000	00:30	0.00	0.005	0.49	0.07
01Jan2000	00:31	0.00	0.005	0.48	0.07
01Jan2000	00:32	0.00	0.005	0.47	0.07
01Jan2000	00:33	0.00	0.005	0.46	0.07
01Jan2000	00:34	0.00	0.005	0.46	0.07
01Jan2000	00:35	0.00	0.005	0.45	0.07
01Jan2000	00:36	0.00	0.005	0.44	0.07
01Jan2000	00:37	0.00	0.005	0.43	0.07
01Jan2000	00:38	0.00	0.004	0.42	0.07
01Jan2000	00:39	0.00	0.004	0.41	0.07
01Jan2000	00:40	0.00	0.004	0.40	0.07
01Jan2000	00:41	0.00	0.004	0.39	0.07
01Jan2000	00:42	0.00	0.004	0.39	0.07
01Jan2000	00:43	0.00	0.004	0.38	0.07
01Jan2000	00:44	0.00	0.004	0.37	0.07
01Jan2000	00:45	0.00	0.004	0.36	0.07
01Jan2000	00:46	0.00	0.004	0.35	0.07
01Jan2000	00:47	0.00	0.004	0.34	0.07
01Jan2000	00:48	0.00	0.004	0.33	0.07
01Jan2000	00:49	0.00	0.003	0.33	0.07
01Jan2000	00:50	0.00	0.003	0.32	0.07
01Jan2000	00:51	0.00	0.003	0.31	0.07
01Jan2000	00:52	0.00	0.003	0.30	0.07
01Jan2000	00:53	0.00	0.003	0.29	0.07
01Jan2000	00:54	0.00	0.003	0.28	0.07
01Jan2000	00:55	0.00	0.003	0.27	0.07
01Jan2000	00:56	0.00	0.003	0.26	0.07

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	00:57	0.00	0.003	0.26	0.07
01Jan2000	00:58	0.00	0.003	0.25	0.07
01Jan2000	00:59	0.00	0.003	0.24	0.07
01Jan2000	01:00	0.00	0.002	0.23	0.07
01Jan2000	01:01	0.00	0.002	0.22	0.07
01Jan2000	01:02	0.00	0.002	0.21	0.07
01Jan2000	01:03	0.00	0.002	0.20	0.07
01Jan2000	01:04	0.00	0.002	0.20	0.07
01Jan2000	01:05	0.00	0.002	0.19	0.07
01Jan2000	01:06	0.00	0.002	0.18	0.07
01Jan2000	01:07	0.00	0.002	0.17	0.07
01Jan2000	01:08	0.00	0.002	0.16	0.07
01Jan2000	01:09	0.00	0.002	0.15	0.07
01Jan2000	01:10	0.00	0.002	0.14	0.07
01Jan2000	01:11	0.00	0.001	0.13	0.07
01Jan2000	01:12	0.00	0.001	0.13	0.07
01Jan2000	01:13	0.00	0.001	0.12	0.07
01Jan2000	01:14	0.00	0.001	0.11	0.07
01Jan2000	01:15	0.00	0.001	0.10	0.07
01Jan2000	01:16	0.00	0.001	0.09	0.07
01Jan2000	01:17	0.00	0.001	0.08	0.07
01Jan2000	01:18	0.00	0.001	0.07	0.07
01Jan2000	01:19	0.00	0.001	0.07	0.07
01Jan2000	01:20	0.00	0.001	0.06	0.07
01Jan2000	01:21	0.00	0.001	0.05	0.07
01Jan2000	01:22	0.00	0.000	0.04	0.07
01Jan2000	01:23	0.00	0.000	0.03	0.07
01Jan2000	01:24	0.00	0.000	0.02	0.07
01Jan2000	01:25	0.02	0.000	0.01	0.07
01Jan2000	01:26	0.03	0.000	0.01	0.06
01Jan2000	01:27	0.05	0.000	0.01	0.05

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	01:28	0.07	0.000	0.01	0.06
01Jan2000	01:29	0.08	0.000	0.01	0.07
01Jan2000	01:30	0.10	0.000	0.01	0.07
01Jan2000	01:31	0.10	0.000	0.02	0.07
01Jan2000	01:32	0.10	0.000	0.02	0.07
01Jan2000	01:33	0.10	0.000	0.03	0.07
01Jan2000	01:34	0.10	0.000	0.03	0.07
01Jan2000	01:35	0.10	0.000	0.03	0.07
01Jan2000	01:36	0.10	0.000	0.04	0.07
01Jan2000	01:37	0.10	0.000	0.04	0.07
01Jan2000	01:38	0.10	0.000	0.05	0.07
01Jan2000	01:39	0.10	0.001	0.05	0.07
01Jan2000	01:40	0.10	0.001	0.06	0.07
01Jan2000	01:41	0.10	0.001	0.06	0.07
01Jan2000	01:42	0.10	0.001	0.06	0.07
01Jan2000	01:43	0.10	0.001	0.07	0.07
01Jan2000	01:44	0.10	0.001	0.07	0.07
01Jan2000	01:45	0.10	0.001	0.08	0.07
01Jan2000	01:46	0.10	0.001	0.08	0.07
01Jan2000	01:47	0.10	0.001	0.09	0.07
01Jan2000	01:48	0.10	0.001	0.09	0.07
01Jan2000	01:49	0.10	0.001	0.09	0.07
01Jan2000	01:50	0.10	0.001	0.10	0.07
01Jan2000	01:51	0.10	0.001	0.10	0.07
01Jan2000	01:52	0.10	0.001	0.11	0.07
01Jan2000	01:53	0.10	0.001	0.11	0.07
01Jan2000	01:54	0.10	0.001	0.11	0.07
01Jan2000	01:55	0.10	0.001	0.12	0.07
01Jan2000	01:56	0.10	0.001	0.12	0.07
01Jan2000	01:57	0.10	0.001	0.13	0.07
01Jan2000	01:58	0.10	0.001	0.13	0.07

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	01:59	0.10	0.001	0.14	0.07
01Jan2000	02:00	0.10	0.001	0.14	0.07
01Jan2000	02:01	0.10	0.002	0.14	0.07
01Jan2000	02:02	0.10	0.002	0.15	0.07
01Jan2000	02:03	0.10	0.002	0.15	0.07
01Jan2000	02:04	0.10	0.002	0.16	0.07
01Jan2000	02:05	0.10	0.002	0.16	0.07
01Jan2000	02:06	0.10	0.002	0.17	0.07
01Jan2000	02:07	0.10	0.002	0.17	0.07
01Jan2000	02:08	0.10	0.002	0.17	0.07
01Jan2000	02:09	0.10	0.002	0.18	0.07
01Jan2000	02:10	0.10	0.002	0.18	0.07
01Jan2000	02:11	0.10	0.002	0.19	0.07
01Jan2000	02:12	0.10	0.002	0.19	0.07
01Jan2000	02:13	0.10	0.002	0.20	0.07
01Jan2000	02:14	0.10	0.002	0.20	0.07
01Jan2000	02:15	0.10	0.002	0.20	0.07
01Jan2000	02:16	0.10	0.002	0.21	0.07
01Jan2000	02:17	0.10	0.002	0.21	0.07
01Jan2000	02:18	0.10	0.002	0.22	0.07
01Jan2000	02:19	0.10	0.002	0.22	0.07
01Jan2000	02:20	0.10	0.002	0.23	0.07
01Jan2000	02:21	0.10	0.002	0.23	0.07
01Jan2000	02:22	0.10	0.002	0.23	0.07
01Jan2000	02:23	0.10	0.003	0.24	0.07
01Jan2000	02:24	0.10	0.003	0.24	0.07
01Jan2000	02:25	0.10	0.003	0.25	0.07
01Jan2000	02:26	0.10	0.003	0.25	0.07
01Jan2000	02:27	0.10	0.003	0.25	0.07
01Jan2000	02:28	0.10	0.003	0.26	0.07
01Jan2000	02:29	0.10	0.003	0.26	0.07

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	02:30	0.10	0.003	0.27	0.07
01Jan2000	02:31	0.10	0.003	0.27	0.07
01Jan2000	02:32	0.10	0.003	0.28	0.07
01Jan2000	02:33	0.10	0.003	0.28	0.07
01Jan2000	02:34	0.10	0.003	0.28	0.07
01Jan2000	02:35	0.10	0.003	0.29	0.07
01Jan2000	02:36	0.10	0.003	0.29	0.07
01Jan2000	02:37	0.10	0.003	0.30	0.07
01Jan2000	02:38	0.10	0.003	0.30	0.07
01Jan2000	02:39	0.10	0.003	0.31	0.07
01Jan2000	02:40	0.10	0.003	0.31	0.07
01Jan2000	02:41	0.10	0.003	0.31	0.07
01Jan2000	02:42	0.10	0.003	0.32	0.07
01Jan2000	02:43	0.10	0.003	0.32	0.07
01Jan2000	02:44	0.10	0.003	0.33	0.07
01Jan2000	02:45	0.10	0.004	0.33	0.07
01Jan2000	02:46	0.10	0.004	0.34	0.07
01Jan2000	02:47	0.10	0.004	0.34	0.07
01Jan2000	02:48	0.10	0.004	0.34	0.07
01Jan2000	02:49	0.10	0.004	0.35	0.07
01Jan2000	02:50	0.10	0.004	0.35	0.07
01Jan2000	02:51	0.10	0.004	0.36	0.07
01Jan2000	02:52	0.10	0.004	0.36	0.07
01Jan2000	02:53	0.10	0.004	0.37	0.07
01Jan2000	02:54	0.10	0.004	0.37	0.07
01Jan2000	02:55	0.10	0.004	0.37	0.07
01Jan2000	02:56	0.10	0.004	0.38	0.07
01Jan2000	02:57	0.10	0.004	0.38	0.07
01Jan2000	02:58	0.10	0.004	0.39	0.07
01Jan2000	02:59	0.10	0.004	0.39	0.07
01Jan2000	03:00	0.10	0.004	0.39	0.07

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	03:01	0.10	0.004	0.40	0.07
01Jan2000	03:02	0.10	0.004	0.40	0.07
01Jan2000	03:03	0.10	0.004	0.41	0.07
01Jan2000	03:04	0.10	0.004	0.41	0.07
01Jan2000	03:05	0.10	0.004	0.42	0.07
01Jan2000	03:06	0.10	0.004	0.42	0.07
01Jan2000	03:07	0.10	0.005	0.42	0.07
01Jan2000	03:08	0.10	0.005	0.43	0.07
01Jan2000	03:09	0.10	0.005	0.43	0.07
01Jan2000	03:10	0.10	0.005	0.44	0.07
01Jan2000	03:11	0.10	0.005	0.44	0.07
01Jan2000	03:12	0.10	0.005	0.45	0.07
01Jan2000	03:13	0.10	0.005	0.45	0.07
01Jan2000	03:14	0.10	0.005	0.45	0.07
01Jan2000	03:15	0.10	0.005	0.46	0.07
01Jan2000	03:16	0.10	0.005	0.46	0.07
01Jan2000	03:17	0.10	0.005	0.47	0.07
01Jan2000	03:18	0.10	0.005	0.47	0.07
01Jan2000	03:19	0.10	0.005	0.48	0.07
01Jan2000	03:20	0.10	0.005	0.48	0.07
01Jan2000	03:21	0.10	0.005	0.48	0.07
01Jan2000	03:22	0.10	0.005	0.49	0.07
01Jan2000	03:23	0.10	0.005	0.49	0.07
01Jan2000	03:24	0.10	0.005	0.50	0.07
01Jan2000	03:25	0.10	0.005	0.50	0.07
01Jan2000	03:26	0.10	0.005	0.50	0.07
01Jan2000	03:27	0.10	0.005	0.51	0.07
01Jan2000	03:28	0.10	0.005	0.51	0.07
01Jan2000	03:29	0.10	0.006	0.52	0.07
01Jan2000	03:30	0.10	0.006	0.52	0.07
01Jan2000	03:31	0.10	0.006	0.53	0.07

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	03:32	0.10	0.006	0.53	0.07
01Jan2000	03:33	0.10	0.006	0.53	0.07
01Jan2000	03:34	0.10	0.006	0.54	0.07
01Jan2000	03:35	0.10	0.006	0.54	0.07
01Jan2000	03:36	0.10	0.006	0.55	0.07
01Jan2000	03:37	0.12	0.006	0.55	0.07
01Jan2000	03:38	0.13	0.006	0.56	0.07
01Jan2000	03:39	0.15	0.006	0.57	0.07
01Jan2000	03:40	0.17	0.006	0.58	0.07
01Jan2000	03:41	0.18	0.006	0.60	0.07
01Jan2000	03:42	0.20	0.007	0.61	0.07
01Jan2000	03:43	0.20	0.007	0.63	0.07
01Jan2000	03:44	0.20	0.007	0.65	0.07
01Jan2000	03:45	0.20	0.007	0.66	0.07
01Jan2000	03:46	0.20	0.007	0.68	0.07
01Jan2000	03:47	0.20	0.007	0.70	0.07
01Jan2000	03:48	0.20	0.008	0.71	0.07
01Jan2000	03:49	0.22	0.008	0.73	0.07
01Jan2000	03:50	0.23	0.008	0.75	0.07
01Jan2000	03:51	0.25	0.008	0.77	0.07
01Jan2000	03:52	0.27	0.009	0.79	0.08
01Jan2000	03:53	0.28	0.009	0.81	0.09
01Jan2000	03:54	0.30	0.009	0.83	0.09
01Jan2000	03:55	0.33	0.009	0.85	0.11
01Jan2000	03:56	0.37	0.010	0.88	0.13
01Jan2000	03:57	0.40	0.010	0.91	0.14
01Jan2000	03:58	0.43	0.010	0.93	0.16
01Jan2000	03:59	0.47	0.011	0.96	0.18
01Jan2000	04:00	0.50	0.011	0.99	0.19
01Jan2000	04:01	0.66	0.012	1.03	0.21
01Jan2000	04:02	0.81	0.012	1.08	0.23

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	04:03	0.97	0.013	1.15	0.25
01Jan2000	04:04	1.12	0.014	1.23	0.27
01Jan2000	04:05	1.28	0.016	1.32	0.29
01Jan2000	04:06	1.43	0.017	1.43	0.32
01Jan2000	04:07	1.23	0.018	1.53	0.34
01Jan2000	04:08	1.02	0.020	1.62	0.35
01Jan2000	04:09	0.82	0.020	1.68	0.37
01Jan2000	04:10	0.61	0.021	1.71	0.37
01Jan2000	04:11	0.41	0.021	1.73	0.37
01Jan2000	04:12	0.20	0.021	1.72	0.37
01Jan2000	04:13	0.20	0.021	1.70	0.37
01Jan2000	04:14	0.20	0.020	1.69	0.37
01Jan2000	04:15	0.20	0.020	1.67	0.36
01Jan2000	04:16	0.20	0.020	1.65	0.36
01Jan2000	04:17	0.20	0.020	1.63	0.36
01Jan2000	04:18	0.20	0.020	1.61	0.35
01Jan2000	04:19	0.18	0.019	1.60	0.35
01Jan2000	04:20	0.17	0.019	1.58	0.35
01Jan2000	04:21	0.15	0.019	1.56	0.34
01Jan2000	04:22	0.13	0.019	1.54	0.34
01Jan2000	04:23	0.12	0.018	1.52	0.34
01Jan2000	04:24	0.10	0.018	1.49	0.33
01Jan2000	04:25	0.10	0.018	1.47	0.33
01Jan2000	04:26	0.10	0.017	1.45	0.32
01Jan2000	04:27	0.10	0.017	1.43	0.32
01Jan2000	04:28	0.10	0.017	1.40	0.31
01Jan2000	04:29	0.10	0.016	1.38	0.31
01Jan2000	04:30	0.10	0.016	1.36	0.30
01Jan2000	04:31	0.10	0.016	1.33	0.30
01Jan2000	04:32	0.10	0.016	1.32	0.29
01Jan2000	04:33	0.10	0.015	1.30	0.29

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	04:34	0.10	0.015	1.28	0.28
01Jan2000	04:35	0.10	0.015	1.26	0.28
01Jan2000	04:36	0.10	0.015	1.25	0.28
01Jan2000	04:37	0.10	0.014	1.23	0.27
01Jan2000	04:38	0.10	0.014	1.21	0.27
01Jan2000	04:39	0.10	0.014	1.20	0.26
01Jan2000	04:40	0.10	0.014	1.18	0.26
01Jan2000	04:41	0.10	0.013	1.16	0.25
01Jan2000	04:42	0.10	0.013	1.15	0.25
01Jan2000	04:43	0.10	0.013	1.13	0.24
01Jan2000	04:44	0.10	0.013	1.11	0.24
01Jan2000	04:45	0.10	0.013	1.10	0.24
01Jan2000	04:46	0.10	0.012	1.08	0.23
01Jan2000	04:47	0.10	0.012	1.07	0.23
01Jan2000	04:48	0.10	0.012	1.06	0.22
01Jan2000	04:49	0.10	0.012	1.05	0.22
01Jan2000	04:50	0.10	0.012	1.03	0.21
01Jan2000	04:51	0.10	0.012	1.02	0.21
01Jan2000	04:52	0.10	0.011	1.01	0.20
01Jan2000	04:53	0.10	0.011	1.00	0.20
01Jan2000	04:54	0.10	0.011	0.99	0.20
01Jan2000	04:55	0.10	0.011	0.98	0.19
01Jan2000	04:56	0.10	0.011	0.97	0.19
01Jan2000	04:57	0.10	0.011	0.97	0.18
01Jan2000	04:58	0.10	0.011	0.96	0.18
01Jan2000	04:59	0.10	0.011	0.95	0.17
01Jan2000	05:00	0.10	0.011	0.94	0.17
01Jan2000	05:01	0.10	0.010	0.94	0.16
01Jan2000	05:02	0.10	0.010	0.93	0.16
01Jan2000	05:03	0.10	0.010	0.92	0.16
01Jan2000	05:04	0.10	0.010	0.92	0.15

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	05:05	0.10	0.010	0.91	0.15
01Jan2000	05:06	0.10	0.010	0.91	0.15
01Jan2000	05:07	0.10	0.010	0.90	0.14
01Jan2000	05:08	0.10	0.010	0.90	0.14
01Jan2000	05:09	0.10	0.010	0.89	0.14
01Jan2000	05:10	0.10	0.010	0.89	0.13
01Jan2000	05:11	0.10	0.010	0.89	0.13
01Jan2000	05:12	0.10	0.010	0.88	0.13
01Jan2000	05:13	0.10	0.010	0.88	0.13
01Jan2000	05:14	0.10	0.010	0.88	0.13
01Jan2000	05:15	0.10	0.010	0.87	0.12
01Jan2000	05:16	0.10	0.010	0.87	0.12
01Jan2000	05:17	0.10	0.010	0.87	0.12
01Jan2000	05:18	0.10	0.010	0.87	0.12
01Jan2000	05:19	0.10	0.010	0.86	0.12
01Jan2000	05:20	0.10	0.010	0.86	0.12
01Jan2000	05:21	0.10	0.009	0.86	0.11
01Jan2000	05:22	0.10	0.009	0.86	0.11
01Jan2000	05:23	0.10	0.009	0.86	0.11
01Jan2000	05:24	0.10	0.009	0.86	0.11
01Jan2000	05:25	0.08	0.009	0.85	0.11
01Jan2000	05:26	0.07	0.009	0.85	0.11
01Jan2000	05:27	0.05	0.009	0.85	0.10
01Jan2000	05:28	0.03	0.009	0.84	0.10
01Jan2000	05:29	0.02	0.009	0.83	0.09
01Jan2000	05:30	0.00	0.009	0.82	0.09
01Jan2000	05:31	0.00	0.009	0.81	0.09
01Jan2000	05:32	0.00	0.009	0.80	0.08
01Jan2000	05:33	0.00	0.009	0.80	0.08
01Jan2000	05:34	0.00	0.009	0.79	0.08
01Jan2000	05:35	0.00	0.008	0.78	0.08

Date	Time	Inflow (CFS)	Storage (AC-FT)	Elevation (FT)	Outflow (CFS)
01Jan2000	05:36	0.00	0.008	0.77	0.07
01Jan2000	05:37	0.00	0.008	0.77	0.07
01Jan2000	05:38	0.00	0.008	0.76	0.07
01Jan2000	05:39	0.00	0.008	0.75	0.07
01Jan2000	05:40	0.00	0.008	0.74	0.07
01Jan2000	05:41	0.00	0.008	0.73	0.07
01Jan2000	05:42	0.00	0.008	0.73	0.07
01Jan2000	05:43	0.00	0.008	0.72	0.07
01Jan2000	05:44	0.00	0.008	0.71	0.07
01Jan2000	05:45	0.00	0.007	0.70	0.07
01Jan2000	05:46	0.00	0.007	0.69	0.07
01Jan2000	05:47	0.00	0.007	0.68	0.07
01Jan2000	05:48	0.00	0.007	0.67	0.07
01Jan2000	05:49	0.00	0.007	0.67	0.07
01Jan2000	05:50	0.00	0.007	0.66	0.07
01Jan2000	05:51	0.00	0.007	0.65	0.07
01Jan2000	05:52	0.00	0.007	0.64	0.07
01Jan2000	05:53	0.00	0.007	0.63	0.07
01Jan2000	05:54	0.00	0.007	0.62	0.07
01Jan2000	05:55	0.00	0.007	0.61	0.07
01Jan2000	05:56	0.00	0.006	0.60	0.07
01Jan2000	05:57	0.00	0.006	0.60	0.07
01Jan2000	05:58	0.00	0.006	0.59	0.07
01Jan2000	05:59	0.00	0.006	0.58	0.07
01Jan2000	06:00	0.00	0.006	0.57	0.07
01Jan2000	06:01	0.00	0.006	0.56	0.07
01Jan2000	06:02	0.00	0.006	0.55	0.07
01Jan2000	06:03	0.00	0.006	0.54	0.07
01Jan2000	06:04	0.00	0.006	0.54	0.07
01Jan2000	06:05	0.00	0.006	0.53	0.07
01Jan2000	06:06	0.00	0.006	0.52	0.07

CHAPTER 7 – HYDROLOGY MAPS

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NODE 1000
ELEV 436
POC-1
AREA=10.54AC
Q_{100}=21.21CFS

NODE 2000
ELEV 438
IE 433
POC-2
AREA=59.83AC
Q_{100}=75.65CFS

NODE 20
ELEV 440

NODE 9
ELEV 439

NODE 101
ELEV 445
IE 440

NODE 19
ELEV 454

NODE 4
ELEV 509

NODE 3
ELEV 500

NODE 8
ELEV 498

NODE 7
ELEV 493

NODE 12
ELEV 494

NODE 11
ELEV 516

NODE 21
ELEV 495

NODE 22
ELEV 478

NODE 10
ELEV 536

NODE 13
ELEV 536

NODE 15
ELEV 490

NODE 14
ELEV 523

NODE 17
ELEV 475

NODE 18
ELEV 478

NODE 100
IE 474
$AREA_{OFF}$=50.27 AC
Q_{100}=45.86 CFS

NODE 16
ELEV 480

NODE 2
ELEV 695

NODE 1
ELEV 710

NODE 6
ELEV 706

NODE 5
ELEV 710

NODES		
1–2	0.10 ac	0.20 cfs
2–3	1.49 ac	2.39 cfs
3–1000	2.62 ac	6.91 cfs
4–3	0.12 ac	0.53 cfs
5–6	0.05 ac	0.10 cfs
6–7	2.18 ac	3.55 cfs
7–9	2.66 ac	7.27 cfs
8–7	0.14 ac	0.62 cfs
9–1000	0.36 ac	1.09 cfs
10–11	0.13 ac	0.26 cfs
11–12	0.62 ac	1.13 cfs
12–7	0.07 ac	0.23 cfs
13–14	0.08 ac	0.28 cfs
14–15	0.45 ac	1.47 cfs
15–101	0.51 ac	2.16 cfs
16–17	0.08 ac	0.35 cfs
16–18	0.13 ac	0.54 cfs
17–101	2.24 ac	8.41 cfs
18–19	2.14 ac	7.31 cfs
19–20	0.55 ac	1.85 cfs
20–2000	0.09 ac	0.39 cfs
21–22	0.12 ac	0.53 cfs
22–20	3.17 ac	11.95 cfs
0.39		

L=298' L=128' L=722' L=117' L=512' L=100' L=100' L=541' L=148' L=609' L=93' L=125' L=100' L=543' L=100' L=100' L=106' L=542' L=509' EX 36" RCP L=100' L=100' L=660' L=485'

EXISTING DRAINAGE AREAS PER LANTERN CREST SENIOR LIVING (PHASE III) DRAINAGE STUDY.

LEGEND

BASIN INFO — NODE TO NODE; AREA (AC); Q (CFS)

BASIN LIMITS

PROJECT BOUNDARY

FLOW–LINE L=100'

NODE INFO — NODE # / ELEVATION

100 50 0 100 200 300

SCALE: 1" = 100'

NO.	DESCRIPTION	DATE	APP'D
	REVISIONS		

Civil Engineering · Environmental
Land Surveying
2442 Second Avenue
San Diego, CA 92101
(619)232–9200 (619)232–9210 Fax
R·E·C Consultants, Inc.

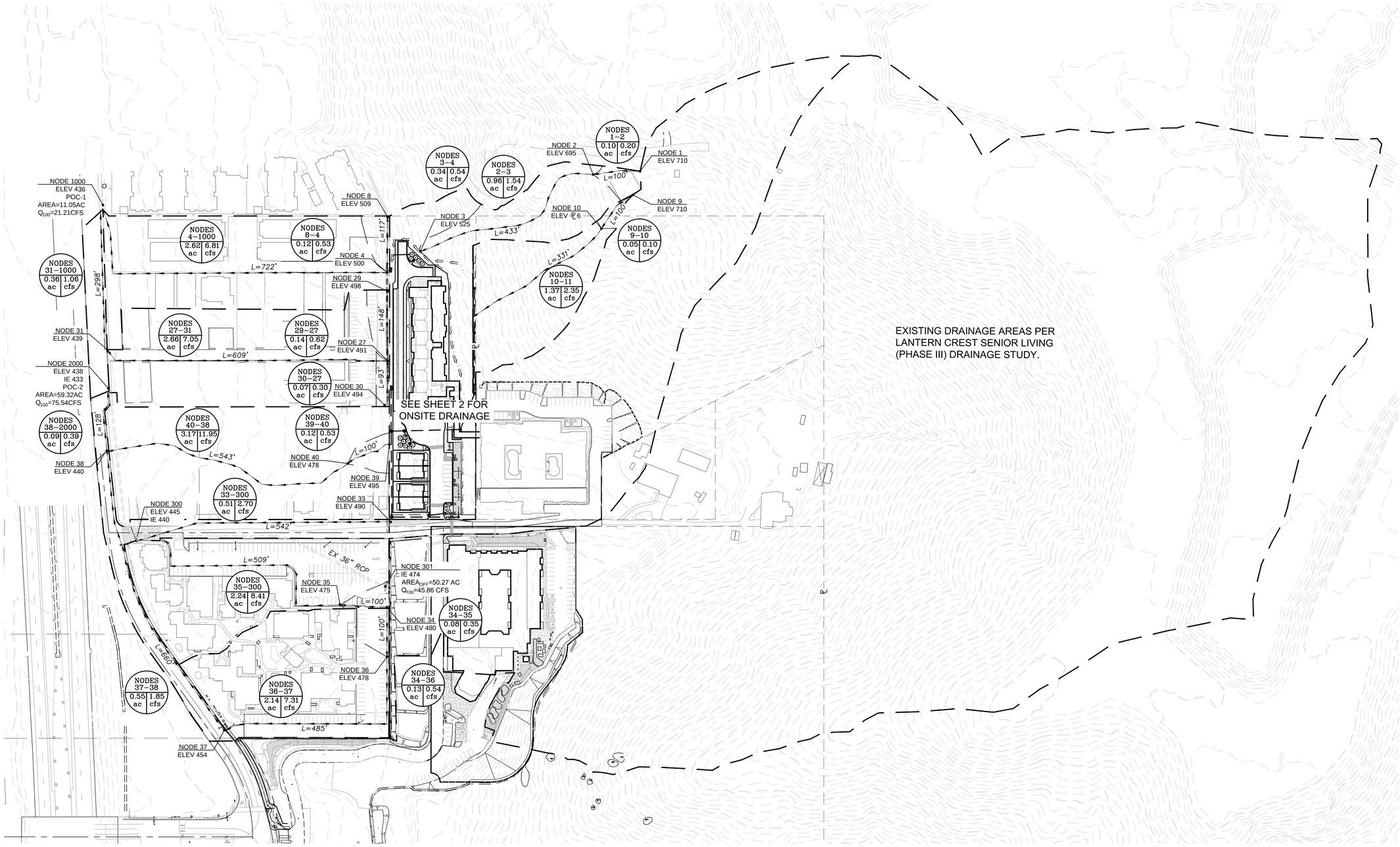
DATE: 04.01.2019
SCALE: 1" = 100'
DRAWN: GMB
CHECKED: L.M.

SHEET TITLE: HYDROLOGY - EXISTING

PROJECT: LANTERN CREST RIDGE
LANTERN CREST WAY
SANTEE, CA 92071

SHEET 1 OF 1 SHEETS

SAVE DATE: 4/1/2019 ~ PLOT DATE: 4/1/2019 ~ FILE NAME: P:\Acad\1384 Lantern Crest Addition\Reports\Dronage Study\190322 – Ex. Drainage.dwg



LEGEND

BASIN INFO — NODE TO NODE; AREA (AC); Q (CFS)

BASIN LIMITS

PROJECT BOUNDARY

FLOW–LINE L=100'

NODE INFO NODE # / ELEVATION

100 50 0 100 200 300

SCALE: 1" = 100'

REVISIONS			
NO.	DESCRIPTION	DATE	APP'D

Civil Engineering · Environmental
Land Surveying

2442 Second Avenue
San Diego, CA 92101
(619)232–9200 (619)232–9210 Fax

R·E·C Consultants, Inc.

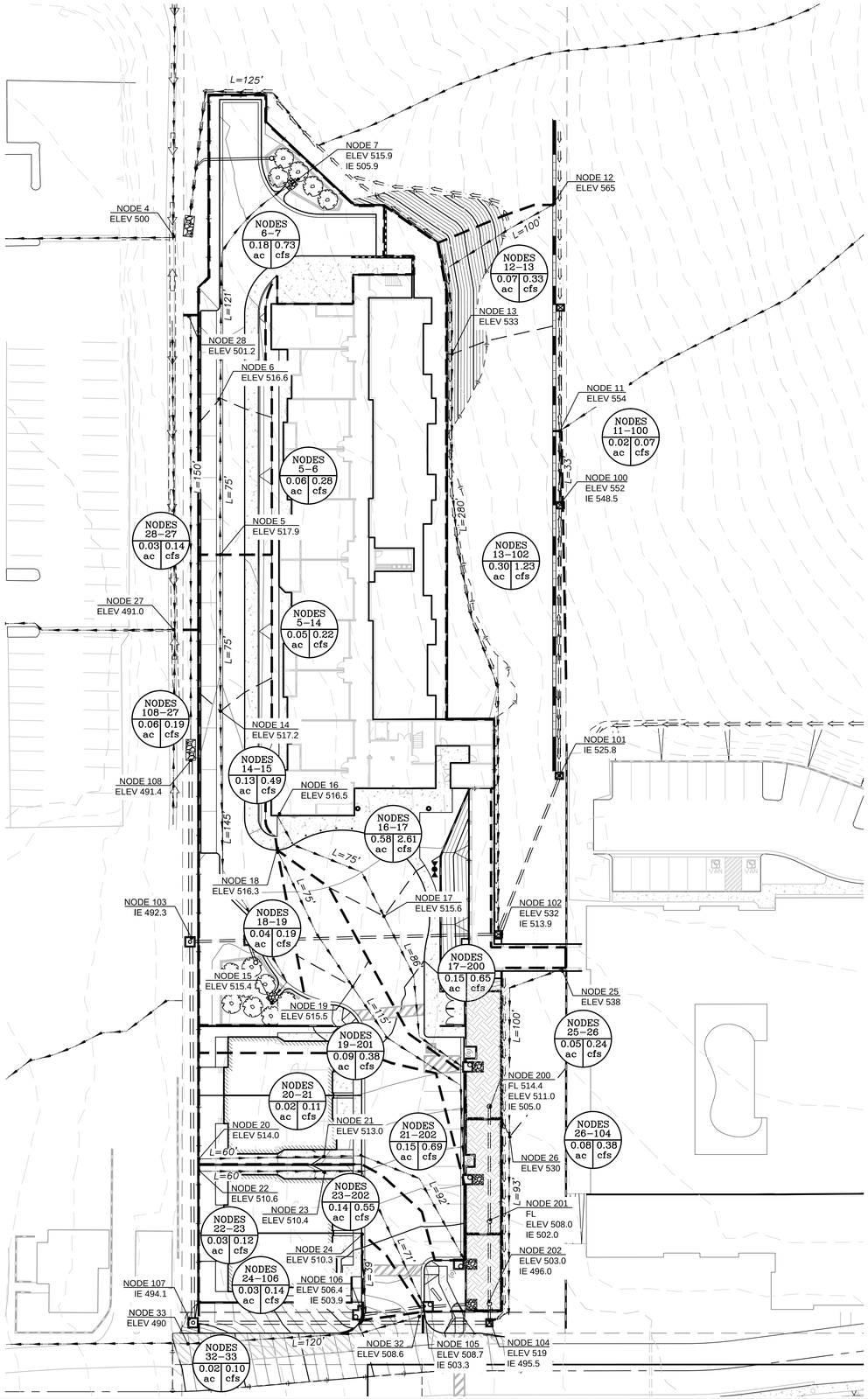
DATE: 04.01.2019
SCALE: 1" = 100'
DRAWN: GMB
CHECKED: L.M.

SHEET TITLE: HYDROLOGY - PROPOSED

PROJECT: LANTERN CREST RIDGE
LANTERN CREST WAY
SANTEE, CA 92071

SHEET 1 OF 2 SHEETS

SAVE DATE: 4/4/2019 ~ PLOT DATE: 4/4/2019 ~ FILE NAME: P:\Acad\1384 Lantern Crest Addition\Reports\Drainage Study\190322 – Prop Drainage.dwg



LEGEND

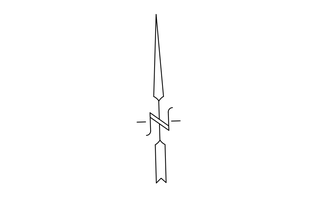
BASIN INFO — NODE TO NODE; AREA (AC); Q (CFS)

BASIN LIMITS

PROJECT BOUNDARY

FLOW–LINE — L=100'

NODE INFO — NODE # / ELEVATION



NO.	DESCRIPTION	DATE	APP'D
	REVISIONS		

Civil Engineering • Environmental
Land Surveying
2442 Second Avenue
San Diego, CA 92101
(619)232–9200 (619)232–9210 Fax
R•E•C
Consultants, Inc.

DATE: 04.01.2019
SCALE: 1" = 30'
DRAWN: GMB
CHECKED: L.M.

SHEET TITLE: HYDROLOGY - PROPOSED

PROJECT: LANTERN CREST RIDGE
LANTERN CREST WAY
SANTEE, CA 92071

SHEET 2 OF 2 SHEETS

SAVE DATE: 4/4/2019 ~ PLOT DATE: 4/4/2019 ~ FILE NAME: P:\Accel\1384 Lantern Crest Addition\Reports\Drainage Study\190322 – Prop. Drainage.dwg

CHAPTER 8 – REFERENCE MATERIAL

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JN 1578-00

HYDROLOGY/HYDRAULIC STUDY

Lantern Crest
Santee, CA 92071

APN: 384-142-15, 16, 17, 18, 19

Prepared by
CDS Civil Engineers
110 Town Center Parkway
Santee, CA 92071

Prepared for :

Santee Senior Retirement Communities, LLC
110 Town Center Parkway
Santee, Ca 92071

August 30, 2007
Revised February 5, 2008
Revised March 7, 2008
Revised April 21, 2008

CDS CIVIL ENGINEERS
110 Town Center Parkway, Santee, CA 92071-3144
Ph. 619-448-6666 Fax 619-448-5404

INTRODUCTION

The objective of this report is to demonstrate post development runoff flow rates and predevelopment runoff flow rates from the 100-year storm event. This will be accomplished using the guidelines set forth from the San Diego County Hydrology Manual, June 2003. The calculations are assisted with San Diego County Rational Hydrology Program CIVILCADD/CIVILDESIGN Engineering Software,(c)1991-2003 Version 6.

PROJECT DESCRIPTION

The 26.69 acre site is located in the eastern portion of the City of Santee, CA. The property is at the eastern end of Prospect Avenue adjacent to Highway 67. Graves Avenue and an existing apartment complex border the project to the west.

The site currently contains vacant land sloping up to the northeast to a steep hilltop at the very eastern edge of the City of Santee. Once developed the site will contain a senior development, consisting of buildings, parking lots and private roads.

Known:

- The project site consists of soil class B and C (see Appendix C)
- The 100-year 6-hour precipitation is 2.75 in.
- The 100-year 24-hour precipitation is 3.8 in.

EXISTING CONDITIONS (see Appendix A)

Subbasin 1, labeled as "A"

The first subbasin consists of the 50.67 acres to the northeast of the property (see existing drainage map). The storm water runoff discharges into an existing 36" rcp drain pipe at the westerly boundary of the development at node 1.5.

The total flow rate exiting the site at node 1.5 is **Q_{100}= 49.24 cfs**

Subbasin 2, labeled as "B"

This second subbasin consists of the westerly 5.33 acres of the property. The storm water runoff discharges onto the eastern side of Graves Avenue, next to the apartment complex, at node 2.5

The total flow rate exiting the site at node 2.5 is **Q_{100}= 7.45 cfs**

Subbasin 3, labeled as "C"

This third subbasin consists of 12.85 acres. The storm water runoff discharges into an existing brow ditch at the southwest corner of the development, next to the apartment complex, at node 3.5.

The total flow rate exiting the site at node 3.5 is **Q_{100}= 17.72 cfs**

POST DEVELOPED CONDITIONS (see Appendix B) (for Phase 1 only, see Appendix B4)
The post development drainage pattern will consist of three basins each of which contain several sub-basins.

Discharging into the 36" RCP Storm drain, Node 7.5
This basin consists of the northerly portion of the development. The exit point will be into the existing 36" public storm drain along the westerly boundary. Drainage area "A" collects runoff from the existing slope to the east, in an underground storage tank in the northeast parking area of the development. This tank will have positive drainage at all times and will allow for the storage of stormwater runoff during 100 year storm events. A stormdrain system will route the runoff from existing slopes and developed areas through the site to the west. All stormwater runoff will confluence at Node 7.5.

The Hyrdaflow software was used to size the storage tank. The outflow from the tank is illustrated as the user defined input in Civil-D runs from Node 1.0 to 1.1 (See Appendix B).

The results from the San Diego County Rational Hydrology program show that the peak flow rate off the property from the second basin at node 7.5 is **Post $Q_{100} \leq$ Ex Q_{100}.**

Discharging into the 18" RCP Storm drain along Graves Avenue, Node 2.7
This second basin consists of the central portion of the development. The exit point will be into the 18" public storm drain in Graves Avenue. This drainage area collects runoff from the existing slope to the east down to catch basins at the bottom of each hill. The catch basins route the runoff into a large drainage pipe running to the west located in the parking lot in subbasin "R".

The tank shall consist of a LandMax Hancor PVC tank (or equivalent). The tank dimension will be (2) 4-foot diameter pipes 200 feet long lying at 1% min. slope. The Hyrdaflow software was used to size the tank and outlet devices. The 6" PVC outlet connects back into the stormdrain system at node 2.3. The outflow from the tank is illustrated as the user defined input in Civil-D runs from Node 2.25 to 2.3 (See Appendix B).

The results from the San Diego County Rational Hydrology program show that the peak flow rate off the property from the second basin at node 2.7 is **Post Q_{100} = 7.65, Ex Q_{100} = 7.45.**

Exiting at the existing Brow Ditch in the southwest corner, Node 5.1
This basin contains drainage areas which lie generally in the southern portion of the project. These areas collect runoff form the existing slope to the east into catch basins at the bottom of each area. Storm water pipes will route this runoff into storage tank to reduce overall runoff totals. The runoff from all improved areas will be routed to the 4' bio-swale located along the southerly boundary. All areas will confluence at Node 5.1

The tank shall consist of a LandMax Hancor PVC tank (or equivalent). The tank dimension will be (2) 4-foot diameter pipes, 200 feet long lying at 1% min. slope. The Hyrdaflow software was used to size the tank and outlet devices (see Appendix B for results). The 8" pvc outlet connects back into the stormdrain system at node 1.37. The outflow from the tank is illustrated as the user defined input in Civil-D from Node 1.36 to 1.37 (See Appendix B).

For post developed conditions, the peak flow rate exiting the site at node 5.1 is **Post $Q_{100} \leq$ Ex Q_{100}.**

EXISTING vs. PROPOSED CONDITIONS

The total site discharge has been decreased from existing to post developed conditions. The following table illustrated the existing vs. post construction calculated runoff.

Table 2 Existing Conditions vs. Post Conditions

	36" rcp (node 7.5) (cfs)	Graves Avenue (node 2.7)(cfs)	Brow Ditch (node 5.1)(cfs)	**Total (cfs)**
Existing Flows	49.24	7.45	17.72	**74.41**
Proposed Flows	45.86	7.65	15.42	**68.93**

Conclusion:

Post-development flow will not alter the drainage patterns onsite with regards to location of where the runoff exits the site. However, due to increasing impervious area, there will be a slight increase in flow to those locations. In order to mitigate the increase in runoff from the project development, underground tanks have been utilized in order to reduce runoff to existing levels. All the storm drainpipes have been sized properly and all the inlets have been determined adequate to convey the flow rate. There will be no negative impacts downstream from the development.

APPENDIX A

EXISTING CONDITIONS
100-YEAR STORM

APPENDIX B

POST CONDITIONS
100-YEAR STORM

APPENDIX B1

POST CONDITIONS
100-YEAR STORM
NORTH BASIN

APPENDIX B2

POST CONDITIONS
100-YEAR STORM
CENTRAL BASIN

APPENDIX B3

POST CONDITIONS
100-YEAR STORM
SOUTH BASIN

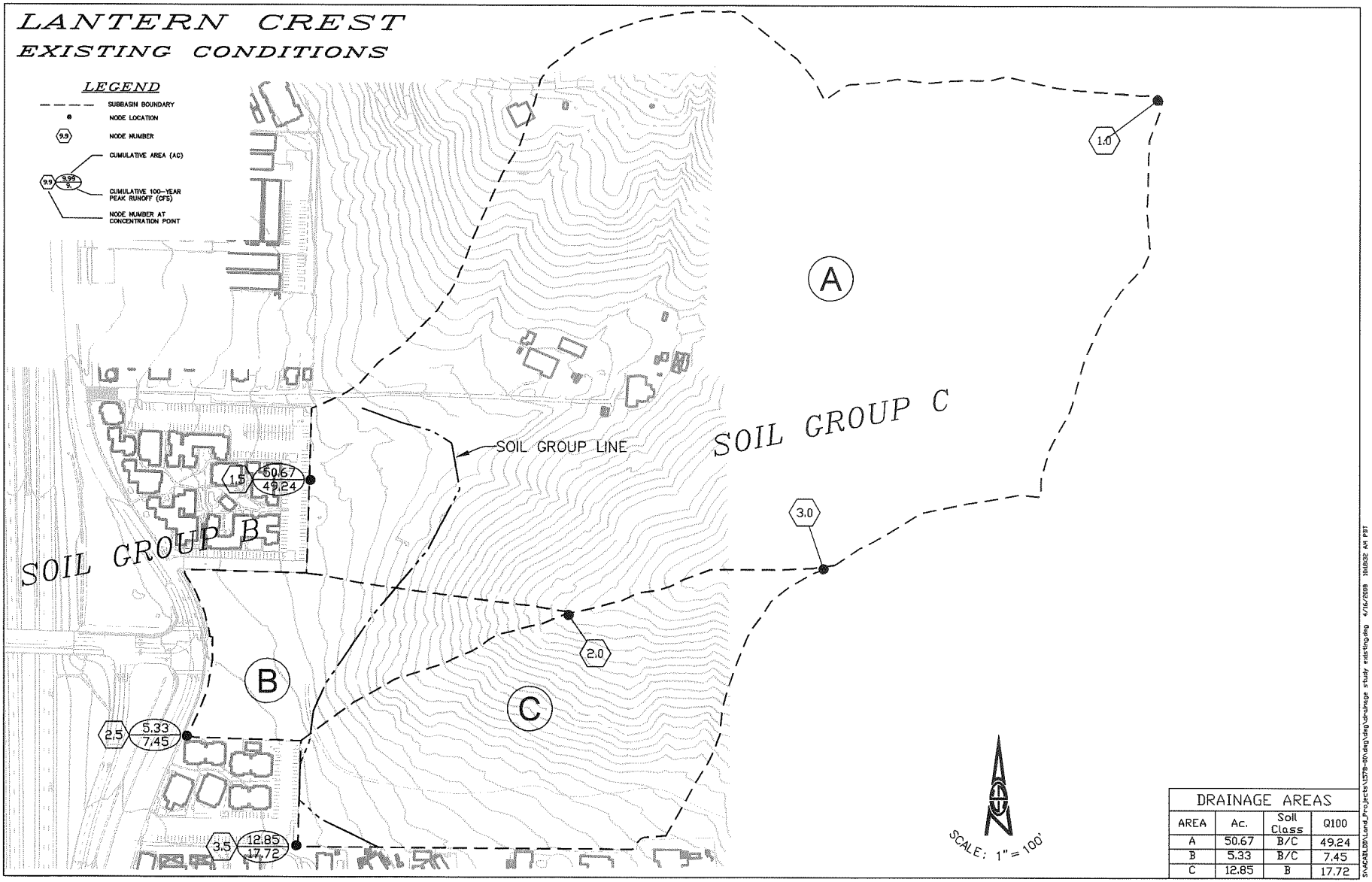
APPENDIX B4

POST CONDITIONS
100-YEAR STORM
NORTH BASIN
PHASE 1 ONLY

APPENDIX C

HYDROLIGIC SUPPLEMENTS

LANTERN CREST
EXISTING CONDITIONS



DRAINAGE AREAS			
AREA	Ac.	Soil Class	Q100
A	50.67	B/C	49.24
B	5.33	B/C	7.45
C	12.85	B	17.72

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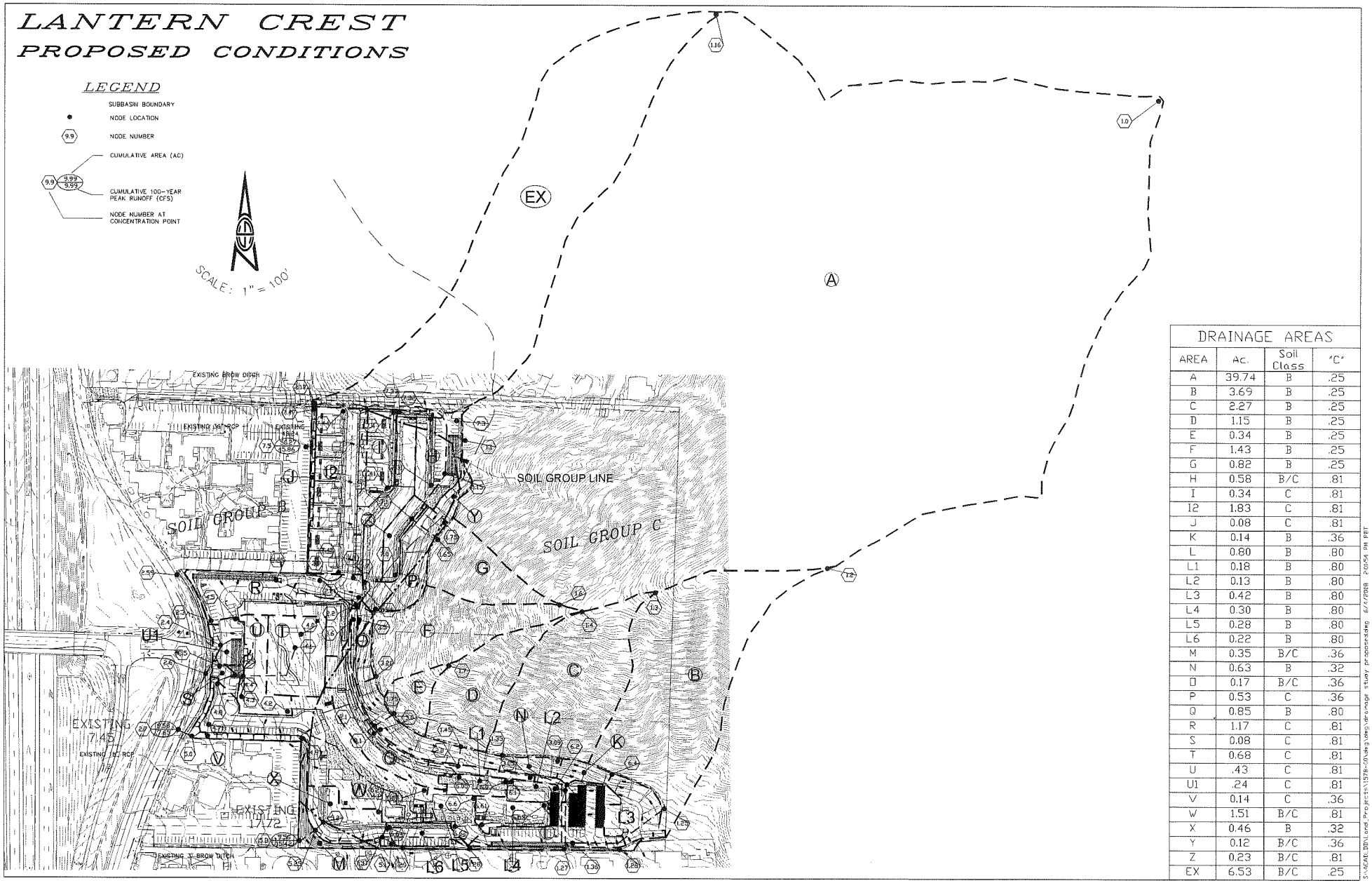
LANTERN CREST
PROPOSED CONDITIONS



DRAINAGE AREAS			
AREA	Ac.	Soil Class	"C"
A	39.74	B	.25
B	3.69	B	.25
C	2.27	B	.25
D	1.15	B	.25
E	0.34	B	.25
F	1.43	B	.25
G	0.82	B	.25
H	0.58	B/C	.81
I	0.34	C	.81
I2	1.83	C	.81
J	0.08	C	.81
K	0.14	B	.36
L	0.80	B	.80
L1	0.18	B	.80
L2	0.13	B	.80
L3	0.42	B	.80
L4	0.30	B	.80
L5	0.28	B	.80
L6	0.22	B	.80
M	0.35	B/C	.36
N	0.63	B	.32
O	0.17	B/C	.36
P	0.53	C	.36
Q	0.85	B	.80
R	1.17	C	.81
S	0.08	C	.81
T	0.68	C	.81
U	.43	C	.81
U1	.24	C	.81
V	0.14	C	.36
W	1.51	B/C	.81
X	0.46	B	.32
Y	0.12	B/C	.36
Z	0.23	B/C	.81
EX	6.53	B/C	.25

S:\RDR\Land Projects\1578-00\dwg\drainage study proposed.dwg 6/4/2008 2:01:54 PM PDT

INVOICE

SDC172004-r

From:
Lakeside Associates, LLC
110 Town Center Parkway
Santee, CA 92071

To:
San Diego Christian College
200 Riverview Pkwy.
Santee, CA 92071

Location:
10152 Mission Gorge Road
Suite A
Santee, CA 92071

Date	Acct,#
Mar.27, 2017	SDCC12013

Amount Enclosed

Rent Due: Apr.1, 2017 **$ 9,817.32**

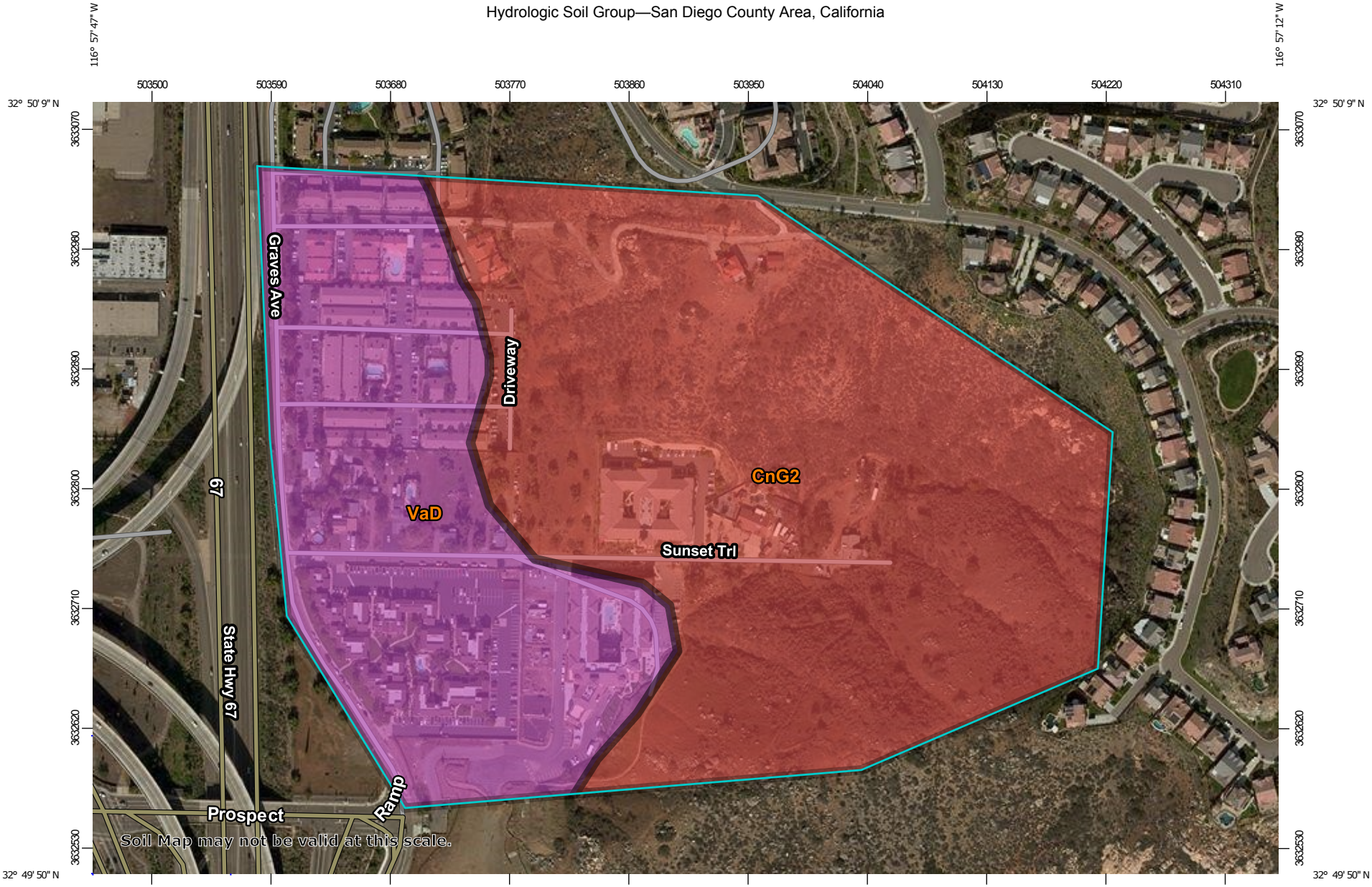
Please detach and return the TOP portion with your payment.

Lakeside Associates, LLC
Re: San Diego Christian College
Acct# SDCC12013

	Suite A: Rent Apr.1, 2017		$ 5,520.52
	Suite B: Rent Apr.1, 2017		2,560.00
	CAM for: Apr.1, 2017		1,990.00
	Amount due:		$ 10,070.52
	Previous Balance:		
	Mar./2017 Rent & CAM	10,070.52	
	Feb./2017 Rent & CAM	10,070.52	
	Payment received ck#16143979	(5,520.52)	
	Payment received ck#16651760	(7,175.84)	
Feb./2017	Less: Credit State of Calif. Rent	(4,000.00)	
Mar./2017	Less: Credit State of Calif. Rent	(4,000.00)	(555.32)
	late charge		302.12
	Total Amount Due:		9,817.32

Current	Over 5	Over 12	Over 30	Over 60	TOTAL AMOUNT DUE
$ 10,070.52	$ -	$ (555.32)	302.12	$ -	**$ 9,817.32**

Please make check payable: Lakeside Associates, LLC
Mailing Address: 110 Town Center Parkway
Santee, CA 92071



Map Scale: 1:4,090 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

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.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
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 13, Sep 12, 2018

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
CnG2	Cieneba-Fallbrook rocky sandy loams, 30 to 65 percent slopes, eroded	D	39.4	64.6%
VaD	Visalia sandy loam, 9 to 15 percent slopes	A	21.6	35.4%
Totals for Area of Interest			**61.0**	**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

Map Scale: 1:675 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 10 20 40 60

Feet: 0 30 60 120 180

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

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.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
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 12, Sep 13, 2017

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

Date(s) aerial images were photographed: Dec 7, 2014—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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
CnG2	Cieneba-Fallbrook rocky sandy loams, 30 to 65 percent slopes, eroded	D	1.7	99.7%
VaD	Visalia sandy loam, 9 to 15 percent slopes	A	0.0	0.3%
Totals for Area of Interest			**1.7**	**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:

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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

possible updated or additional flood hazard information.

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

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

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

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

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

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

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

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

Base map information shown on this FIRM was provided in digital format by the USDA National Agriculture Imagery Program (NAIP). this information was photogrammetrically compiled at a scale of 1:24,000 from aerial photography dated 2009.

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

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

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

Contact the **FEMA Map Service Center** at 1-877-FEMA MAP (1-877-336-2627) for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip/.

The **"profile base lines"** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the "profile base line", in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

ZONE DESCRIPTIONS

ZONE A No Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE A99 Areas to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.

ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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

1% annual chance floodplain boundary
0.2% annual chance floodplain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities
513 — Base Flood Elevation line and value; elevation in feet*
(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*
* Referenced to the North American Vertical Datum of 1988
A — A — Cross section line
23 — 23 — Transect line
97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
4275000mE — 1000-meter Universal Transverse Mercator grid ticks, zone 11
6000000 FT — 5000-foot grid values: California State Plane coordinate system, Zone VI (FIPSZONE = 406), Lambert projection
DX5510$_{X}$ — Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
June 19, 1997

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
May 16, 2012 – to update corporate limits, to add roads and road names, to incorporate previously issued Letters of Map Revision, and to update map elevations to North American Vertical Datum of 1988.

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

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 250 500 750 1,000 FEET
150 0 150 300 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1654G

FIRM
FLOOD INSURANCE RATE MAP
SAN DIEGO COUNTY, CALIFORNIA AND INCORPORATED AREAS

PANEL 1654 OF 2375
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EL CAJON, CITY OF	060289	1654	G
SAN DIEGO COUNTY	060284	1654	G
SANTEE, CITY OF	060703	1654	G

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

MAP NUMBER
06073C1654G

MAP REVISED
MAY 16, 2012

Federal Emergency Management Agency